ENGINEERING SOCIETY
UNIVERSITY of TORONTO
1946

SIXTIETH EDITION

TRANSACTIONS AND YEAR BOOK

The Engineering Institute of Canada

FOUNDED 1887

The Engineering Institute of Canada is a Dominion-wide organization embracing engineers in all sections of the profession. It operates through twenty-seven branches in the main centres of Canada.

It publishes the Engineering Journal, a monthly technical journal, and works through the medium of its Council and many committees. One of these deals with the problems of the young engineer, in which the Institute is vitally interested.

In five provinces the Institute has co-operative agreements with the local provincial associations of professional engineers, providing for common membership.

In Toronto there is an active branch of the Institute, founded in 1906, which meets regularly in winter months. Associated with it is a Junior Section for all engineers up to the age of thirty-five. Undergraduate engineers are welcome at all meetings.

Student Prizes

The Institute awards annually a number of valuable prizes for students. Some of these are open to all students, others only to members of the Institute, including Student Members.

General Secretary,
L. AUSTIN WRIGHT,
2050 Mansfield St.,
Montreal, Que.

TORONTO BRANCH:
Secretary-Treasurer,
E. G. TALLMAN,
620 Universty Avenue.
Waverley 6789

CANADIAN HEADQUARTERS for

Elevating, Conveying and Modern Mechanical Power Transmission Equipment . . .

. . . Mining Machinery • Grain Elevator and Mill Equipment • V Belt, Roller and Silent Chain Drives • Pulpwood Handling Equipment • Rex Sewage and Sanitation Systems • Pulleys of all types • Variable Speed Units • Belt Conveyors • Steel Rolling Mill Equipment • Gears • Sprockets • Chains • Ball, Roller and Sleeve Bearings Hoists • Elevators, Hoppers and many other types of mechanical equipment for Industry throughout Canada.

United Steel CORPORATION LIMITED

DODGE MANUFACTURING DIVISION

CANADIAN MEAD MORRISON

TORONTO • WELLAND • MONTREAL

WINNIPEG • KIRKLAND LAKE

Association of Professional Engineers

Province of Ontario

ATTENTION OF ENGINEERING STUDENTS

THE ASSOCIATION of Professional Engineers of the Province of Ontario is constituted by the Legislature of the Province of Ontario to govern the practice of professional engineering in this Province. In brief, no person is permitted to practice professional engineering (with certain exemptions as defined in the Act) unless he is a registered Members or Licensee of the Association.

Registration can be obtained by graduates of the faculty of Applied Science and Engineering, University of Toronto, holding the Degree of Bachelor of Applied Science in Engineering, as soon as they are able to submit evidence of satisfactory practical experience.

Provision is made in the Act that an undergraduate may be recorded with the Association while attending University, thereafter, submitting annually information as to his standing and additional engineering experience. When he has acquired the necessary practical experience, he may then apply for final registration, which gives him the right to call himself a Professional Engineer and to practice Professional Engineering. With the exception of persons exempted from the operation of the Act, no one may use the title, "Professional Enginer," or any title similar thereto unless he is a Member or Licensee of the Association.

Over 3,000 undergraduates have recorded themselves with the Association, realizing that it is to their advantage to do so in order to facilitate their registration as Professional Engineers. It also keeps them in touch with the requirements for registration in the Association and the Code of Ethics for Professional Engineers, as well as serving as an introduction to other professional associations.

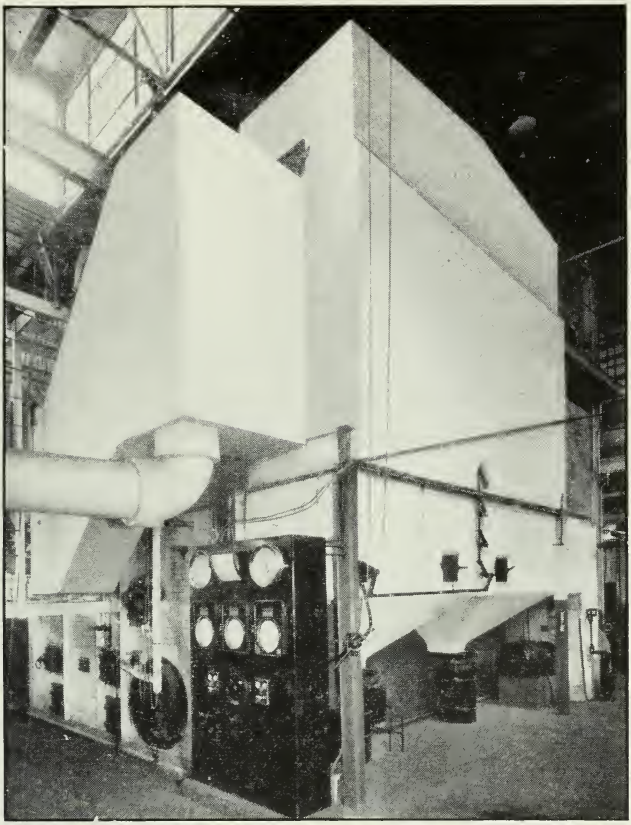
The Association is keenly interested in the welfare of the Young Engineer and is awarding five Scholarships each year (totalling $400) to students in the Faculty of Applied Science and Engineering at the University of Toronto.

Any further information desired may be obtained from the Registrar of the Association.

Association of Professional Engineers

350 Bay Street

TORONTO 1 **ONTARIO**



A Babcock 'INTEGRAL-FURNACE' Boiler Installation

This completely co-ordinated steam-boiler unit includes super heater, air heater, water-cooled furnace, coal pulverizer, burners, instruments, metering and control equipment, and forced and induced draft fans.

The unit is designed to burn pulverized coal, oil or gas, alone or in combination—thus it is possible to utilize at high combustion efficiency, the least expensive commercial fuel available in any locality. This type of unit is also built for stoker firing.

THE "KNOW-HOW" OF WELDING

--- the experience, conclusions and study of practical men

Procedure Handbook of Arc Welding Design and Practice

This is the Seventh Edition—the world's biggest volume of up-to-date authentic information on all phases of arc welding design and procedure. 1,810 photos and drawings, 1,308 pages. The right answers to thousands of problems relative to the use of arc welding in the development, production and maintenance of metal products and structures. **$2.00** postpaid.

Lessons in Arc Welding

Each lesson gives a comlpete explanation of the work to be done. Procedures are given in detail to enable the beginner to advance, step by step, from the elementary work to the more difficult jobs. Makes an ideal textbook for welding classes as well as for men learning the art of welding "on their own." **75c** postpaid.

Simple Blueprint Reading

Provides simplified approach to easy mastery of blueprint reading. Discusses in detail the use of welding symbols—the "short-cut" language used by engineers and draftsmen. Practical exercises and examples, questions and answers. 148 pages, over 100 illustrations. 6″ X 9″ bound in simulated leather. **75c** postpaid.

Welding Metallurgy

A series of lectures prepared for presentation in a fundamental course of metallurgy and metallography at Polytechnic Institute of Brooklyn under the joint auspices of the Institute and the New York Section of the American Welding Society. An easy to understand explanation of welding metallurgy. **$2.00** postpaid.

FREE

Free New Bulletin—48 pages, 55 halftones, 32 line cuts, 45 charts, describing "Fleet-Welding"—a method of increasing the speed of welding of mild steel. Chapters on ARC FORCE, EFFECT OF CURRENT, EFFECT OF ARC LENGTH, COST REDUCTION, PRODUCTION SPEED, PROCEDURE TABLES, CORRECTIVE SUGGESTIONS, SHEET METAL PROCEDURES, SELECTION OF ELECTRODES, etc.

WE ARE NOT BOOK PUBLISHERS

The books mentioned above were published in order to make available to all the information which has come to us through our continuing research as the largest manufacturer of arc welding equipment in the world. When ordering books please mail cheque or money order to address below.

LINCOLN ELECTRIC CO. OF CANADA LTD.

179 Wicksteed Ave., LEASIDE, Toronto 12.

LINCOLN

LARGEST MANUFACTURERS OF ARC WELDING EQUIPMENT IN THE WORLD

WHAT IS GOOD ENGINEERING?

Take a sound background of technical education. Add a sufficient period of practical work in shops and in the field. Mix with this a dash of daring—the kind that is not afraid to tackle new things. Season liberally with caution and integrity. The result is good engineering.

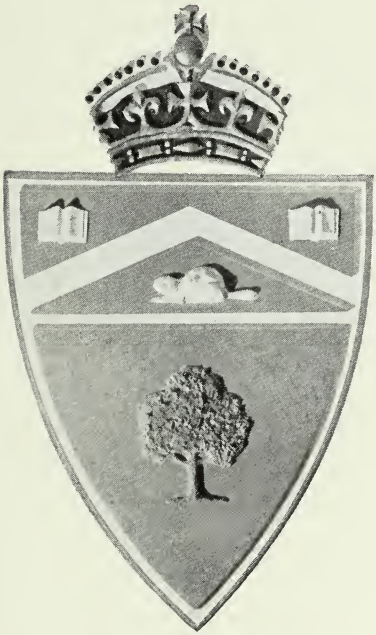
That, at any rate, is our belief at English Electric. This is a young organization—youth being "a state of mind, not a time of life". By the test of its works across Canada, English Electric Company of Canada is proving every year that the familiar Ⓔ Trade Mark means good engineering.

ENGLISH ELECTRIC
COMPANY OF CANADA, LIMITED

Head Office and Factory:
St. Catharines, Ont.
District Offices:
Montreal, Ottawa, Toronto, Kirkland Lake, Calgary, Vancouver.

Represented by:
Foulis & Bennett Electric Limited, Halifax; Railway & Power Engineering Corp., Limited, Winnipeg; Gormans Limited, Edmonton.

Transactions
and
Year Book
1946



Engineering Society

The University of Toronto

Roll of Service

ROLL OF SERVICE

THE ROLL OF SERVICE, COMPILED FOR THIS EDITION OF *Transactions and Year Book*, includes those who enlisted after February, 1945 in the Active Forces.

We wish to acknowledge the very kind co-operation of the Record's Office of the University of Toronto in making this compilation possible. Now that world war II is over the Record's Office would be very appreciative if men who have been on active service or their families would forward information to this office so that complete records of military careers of undergraduates and graduates of S.P.S. could be compiled.

CASUALTY-LIST

H. R. McDONALD.
Killed in action in France—July 13, 1944.

W. T. RICHARDSON.
Killed in action in France—July 22, 1944.

DAVID SHAPIRO.
Killed in action in Italy—December 5, 1944.

H. D. McKIBBON.
Killed in action in Holland—January 18, 1945.

E. W. THOMPSON.
Died on duty at Niagara-on-the-Lake on January 23, 1945.

W. J. CHARD.
Presumed dead in February, 1944.

W. L. MELBOURNE.
Killed in action—February 5, 1945.

W. H. HERTHA.
Killed in action in Luzon—April 16, 1945.

D. W. BAKER.
Killed in the Far East—April 16, 1945.

Roll of Service

J. B. Adams	Fleet Air Arm R. N.
R. B. Adamson	Canadian Army
H. D. Algie, '37	Fleet Air Arm R. N.
A. R. Aiken	U.S. Navy
F. H. Allen	R.C.N.V.R.
J. A. C. Armstrong, '34	R.C.N.V.R.
M. L. Bailley	R.C.A.F.
G. R. Ball	R.C.N.V.R.
P. A. Ballachey	R.H.L.I.
N. A. Bales, '44	R.C.E.M.E.
N. H. Bell	R.C.A.F.
Pete Bell	R.C.N.V.R.
R. M. Bennett, '45	R.C.C.S.
J. H. Brace	R.C.N.V.R.
H. A. Bradley	Fleet Air Arm R. N.
G. M. Brown, '34	R.C.E.M.E.
H. W. B. Bubeck	Fleet Air Arm R. N.
R. T. Cavanaugh, '45	R.C.C.I.S.
K. J. Chisholm, '45	R.C.E.
S. S. W. Cole, '34	R.C.A.F.
J. J. Collins	R. C. E.
G. B. Conguergood	C.I.C.
S. C. Cooper, '45	R.C.E.
D. D. Currie, '45	R.C.E.M.E.
M. R. Davey	R.C.N.V.R.
C. B. Davis	R.C.E.
J. A. Davis	R.C.A.F.
A. B. Danard, '45	R.C.A.
M. Degutis	R.C.A.F.
D. R. DeLaporte	R.C.N.V.R.
W. B. Drowley, '45	R.C.N.V.R.
J. O. Emerson, 45	R.C.E.M.E.
J. H. Fee, '39	C.I.C.
H. W. Ford	C.I.C.
J. E. R. Foreman, '45	R.C.E.M.E.
J. R. Fydell	Fleet Air Arm R. N.
T. R. Hand	U.S. Army

Roll of Service

J. N. Harshaw, '45 ..... R.C.E.
J. M. Haron ..... C.I.C.
G. M. Hislip ..... R.C.N.V.R.
H. M. Hughson, '45 .....
R. W. Jack .....

M. C. Kaufman, '45 ..... R.C.A.
M. J. Kitchen ..... R.C.A.F.
S. Kuriatouski ..... C.A.C.
C. B. Lannon ..... R.C.N.V.R.
J. A. McDonald, '44 ..... R.C.O.C.
J. F. Marr ..... R.C.N.V.R.
R. F. Moore, '45 ..... C.I.C.
W. E. Morley, '45 ..... R.C.A.
R. H. Neame, '45 ..... R.C.E.
M. C. Nealon ..... R.C.A.F.
H. K. Naylor ....

M. J. O'Brien, '45 .....
W. H. O'Laughlin, '45 ..... R.C.E.M.E.
S. Paikin, '45 ..... C.I.C.
H. C. Parnham ..... C.I.C.

F. L. Parker ..... R.C.N.V.R.
E. M. Peacock, '45 ..... R.C.E.M.E.
J. R. Petrinac, '45 ..... R.C.E.M.E.
A. P. Quentin ..... R.C.E.M.E.
W. B. Redpath, '44 ..... R.C.A.
F. A. Reuter, '44 ..... R.C.E.M.E.
W. E. A. Rispin ..... R.C.N.V.R.
A. K. Rowntree, '45 .....

G. I. Russell ..... R.C.N.V.R.
M. I. Speigel, '45 ..... R.C.A.
D. K. Stiles, '44 ..... R.C.E.M.E.
M. Stayanoff, '44 ..... C.I.C.
E. D. Taylor .....
W. J. P. Telford, '45 .....
J. D. H. Tempest, '45 ..... R.C.E.
B. L. Thompson ..... R.C.N.V.R.
C. H. Towson, '41 ..... R.C.N.V.R.
G. L. Weaver ..... C.I.C.

TRANSACTIONS AND YEAR BOOK STAFF

Back Row (standing): A. M. Lount, R. J. Hansen, J. G. Matheson, J. H. Ward.
Front Row (sitting): W. T. McBride, D. A. White, L. E. Owers.
Absent: J. R. Wilkie.

TRANSACTIONS and YEAR BOOK

of the

UNIVERSITY OF TORONTO ENGINEERING SOCIETY

No. 60 JUNE, 1946

EDITORIAL

YOUR BOARD OF EDITORS TAKES GREAT PLEASURE IN PRESENTING the 1946 edition of *Transactions and Year Book*. Through its pages we have tried to sprinkle some of the thoughts and happenings of School and give a picture of the activities of the past year. We hope we have succeeded.

The general layout of the book will be found to be much the same as in previous years, as we deem it an advantage for you to know where to find things.

This has been a year of big changes. Last summer the School Campus was alive with the footsteps of the Summer course. Those hundred odd ex-service men, the vanguard of huge numbers later to attend the University, did themselves proud both scholastically and otherwise. The regular first year was made up entirely of ex-service men, seventy-five percent of whom were married. What a change from a year ago! However, in spite of the many changes, compared to former years, School's sports and social activities went on with the same success. Thanks should be given to the Engineering Society Executive and those

responsible for piloting the ship so well through the seas of changing times.

This year a new branch of School was born—Ajax Division. It is difficult to realize 1,400 first year students. But those are the numbers registered at Ajax. We of the Queen's Park Campus wish to welcome you to School and are proud that you have done so well amid the difficulties of readjustment. Owing to the late registration at Ajax of January 15th and the Book going to press in March, a complete picture of Ajax cannot here be shown but we trust that what is included will be of interest to all. It is certainly a taste of great things to come.

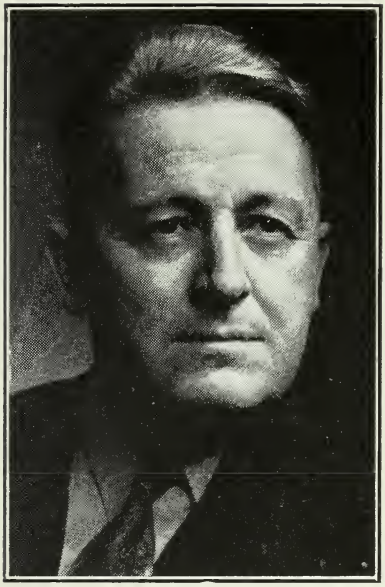
On the front cover of this Book you will find a diamond—the symbol of a Diamond Jubilee. This is our anniversary edition, the Sixtieth publication of *Transactions and Year Book*. We, the members of the Editorial Board, are proud to present this edition to you. We have endeavoured to include items of interest with regard to the history and celebration of such a day. In these pages will be found a message from the founder of the Engineering Society, Dr. T. Kennard Thomson. All those who had the pleasure of meeting him at the School Dinner, I am sure, had the pleasure of meeting a real School man. At a ripe old age he is still very much interested in School activities.

The Anniversary was fittingly celebrated at the School Dinner at Hart House. We have endeavoured to bring this to you by means of a message from Dr. Thomson, the founder of the Engineering Society, and Professor H. E. T. Haultain, the first student president, and appropriate pictures.

We have been fortunate this year in procuring a great number of pictures for the *Year Book* and it is our wish that this number will be equalled in future years. However, it has not been a bed of roses for the Editorial Staff. Due to post war changes and adjustments, printing and advertising have presented difficult problems. As a personal favour to our Business Manager we urge you to keep the names of our advertisers in your mind for the future.

As Editor-in-Chief I wish to thank the other members of the Board for their assistance and untiring energy in gathering the material for this book. To all who have contributed we are deeply grateful and hope our persistence in certain instances has left no ill feelings.

DUNCAN A. WHITE.



Dr. Sidney E. Smith

A MESSAGE TO THE GRADUATING CLASS

I AM HAPPY TO AVAIL MYSELF OF THE OPPORTUNITY AFFORDED TO me by the Editor-in-Chief of the Transactions and Year Book to express congratulations, best wishes and farewell to the graduates of 1946. The Diamond Jubilee of the launching of the official publication of the Engineering Society engenders in us retrospective and prospective moods. We think of the remarkable advances in scientific knowledge that have been made, since 1886, by engineers. It is not an exaggeration to state that during these six decades more has been discovered about the constitution of matter and the forces of nature than in the earlier period stretching far into the dawn of history. Within the past twelve months, the greatest stride has been taken in unleashing the power of the atom. While we marvel at man's ingenuity and genius, we are haunted by the question: What use will be made of those inventions and discoveries? For good or for evil?

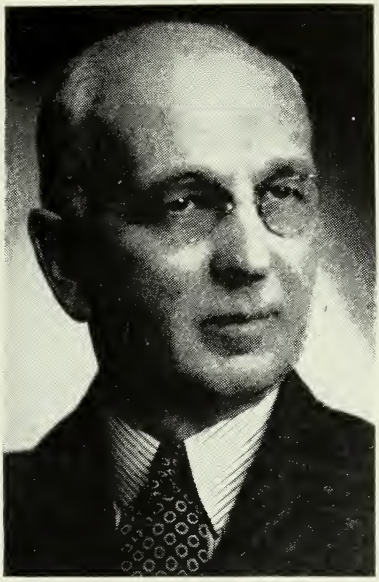
In the nineteenth century, Wordsworth wrote:

> Man now presides
> In power where once he trembled in his weakness,
> Science advances with gigantic strides,
> But are we aught enriched in love and meekness?
>
> What would he say in 1946?

The Atomic Year, 1945, may be known as the turning point which marked either the salvation of our civilization or its very destruction. The engineers and the scientists are not to be condemned for producing this awful dilemma. Mankind has not kept pace with the discoverers. Mankind has failed to use for humanitarian ends the results of their unremitting quests. Engineers and scientists, however, share with their fellow-citizens the guilt of the failure.

Your Alma Mater sends you forth with regret, pride and confidence. The regret is founded in nothing less than an affection for you which has been developed in innumerable instructional periods, both formal and informal. The pride is based in your achievement. The confidence has its source in your promise that you will not be merely expert and proficient in the practice of your profession. In accepting your degree from the University of Toronto, you will execute a bond that you too will give of your best of heart and mind and of resolution and talent in the solving of the vital problems inherent in the very survival of our civilization. You can assist immeasurably in transforming the hellish glare of the atomic bomb that landed on Hiroshima into a benign beacon for a world of decency and righteousness.

THE YEAR GONE BY



REFLECTION ON ONE'S ACHIEVEMENTS OR LACK OF THEM IN A YEAR that has ended is for earnest men a source of strength for the future rather than of lamentation for the past. The great advances of history have for the most part been made through trial and error and not by inspired and unfaltering progress towards a pre-selected goal. Young men and women in college are no exceptions to the rule.

The academic year now coming to a close—the first of the peace years—presents a new situation to the young graduate. The imperious demands of war no longer transcend all others. His employment will be in normal industry and reconstruction. He will need gradually to adjust himself to normal economic laws and to a world in which once more costs and ability to pay will generally determine the issue.

However much the young graduate now leaving the University may yearn for large immediate responsibilities and the compensation that goes with them, he is under a first necessity of proving

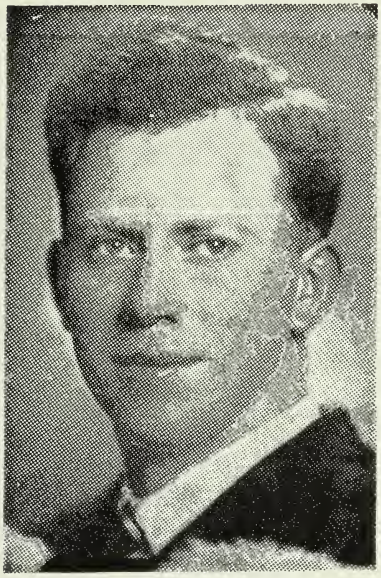
himself to the satisfaction of his seniors. Great corporations and public bodies must make sure of the soundness of the technical decisions that are made in their behalf. And so there must be, even for one who has spent years in a University, what amounts to a period of apprenticeship. The young man should welcome and not seek to avoid it. Under the steady and confident guidance of one more skilled and more experienced than himself, he may build that sureness and that confidence which, in turn, will make him also a master.

It should not be forgotten that the outstanding leaders in engineering, as in any other profession, are themselves students. They never cease to be such. If they were to do so they would very soon become less aware of the significant developments in their art than more industrious and more resolute members of the profession, and that would mean a surrender of leadership.

The need to continue as a student is by no means a dismal or an ascetic prospect. There are joys of understanding that make it an experience that would not voluntarily be lost by those who have achieved it. In every walk of life satisfaction comes from conscientious effort and the normal fruition that follows in its train.

C. R. Young,
Dean.

THE PRESIDENT'S MESSAGE



ANOTHER MILESTONE IN THE HISTORY OF THE ENGINEERING Society has been reached as we approach the culmination of one of the most successful years in the colourful history of S.P.S. Indeed this year of 1945-46 has been unique, for during these past few months the Society not only celebrated its 60th anniversary but added to itself another branch—the Engineering Society at Ajax. This latter is no mere branch—it constitutes about half of the tree itself.

This session began with a good turnout at the Freshman Reception Dance at the Royal York Hotel early in October. From that time on things happened around School in rapid succession.

The Fifty-sixth Annual School Dinner was held in Hart House amid the usual trimmings. Mr. W. A. Osbourne, who was president of the Engineering Society in 1924 and who is now vice-president of Babcocks-Wilcox and Goldie-McCulloch in Galt, was the guest speaker. His brilliant speech was entitled, "Yesterday's Ideas and To-day's Opportunities."

It was very appropriate that we should have with us at this time as guest of honour at the Dinner which was the occasion of official celebration of our Sixtieth Anniversary, the founder of our Engineering Society, Dr. T. Kennard Thomson of New York. After founding the Society in 1885, Dr. Thomson went out into industry as a consultant in Civil Engineering and built over 200 bridge structures in various parts of this continent—a worthy contribution for any Engineer. "A wise man, which built his house upon a rock . . . a foolish man, which built his house upon the sand." Certainly we must admit that Dr. Thomson's building has been on solid rock. The founder of our Society had this to say, "I have always, where possible, gone in for a bed rock foundation. In a few cases where bed rock could not be reached, I have succeeded in putting in foundations which held. . . . Any structure which fails of its own weight, was not properly designed. . . .

"Whitey" Belshaw, Jim Templeton, Gordon Alison, the School Nite committee and the entire stage crew co-operated marvellously to turn out one of the finest School Nites and School Nite Reviews of all time. Here again Engineering genius came running to the rescue in inventing the marvel mechanism of our age. The writer is slightly skeptical as to its eventual practicability after viewing the first product—"Miss Calculation."

We went all out to make the School At-Home this year a success. Thirteen hundred couples thronged the Convention Floor of the Royal York to dance to Jerry Wald's big American band and three Canadian bands.

Open House for the third and fourth year men is here to stay after a successful demonstration for the third consecutive time. *Toike Oike Quarterly* struck an all time high under the guidance of the editor Gordon Rosenthal. The Diamond Jubilee issue of TRANSACTIONS AND YEAR BOOK is worthy of the greatest commendation, and is in the capable hands of Duncan White and his staff. "Bob" Davidson deserves much credit for the attention he has given to General Meetings. They have been excellent, and we of the Class of 4T6 thank him and his committee for organizing the finest Grad Ball a graduating year has ever enjoyed. "Gus" Campbell has carried on an excellent athletic campaign for the Athletic Association this year.

I wish also to thank Bill Daniel for the work he has done in handling the store, and in arranging for Supply purchases for Ajax. Al Klassen is to be complimented on his publicity campaigns, and

for his work on the Varsity Cheering Squad. Our treasurer Roy Tredgett has done good work in the books, and Peter Kingsmill has kept our minutes up to date.

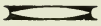
Bob Aldwinckle, president of the Summer Session Class of 4T8, was made Liaison Officer for the Ajax division.

The Committee, on organization of the branch at Ajax, worked long and well. "Mike" McAuliffe, the newly appointed president of the Engineering Society at Ajax, and his able executive are to be complimented for the manner in which they brought that organization into running order.

In conclusion I must stress that much has been accomplished of late in the affairs of our Society. Yet what lies behind us may only be a shadow of the possibilities which loom ahead. And so I say to my successor Bill Daniel and to those who will follow him "Good Luck and keep School's Spirit high."

MURRAY D. MCCULLOCH.

TRANSACTIONS
1946



CONTENTS

ENGINEERING SOCIETY GENERAL MEETINGS
1945-1946

Chairman— MURRAY D. MCCULLOCH

Vice-Chairman— M. DAVIDSON

October 15:

The first Engineering Society General meeting was opened with an interesting address by Mr. Wills MacLauchlin of the Hydro Commission. The speaker outlined some of the important problems related to the subject of Labour and Management.

November 15:

Mr. E. Gauley of the MacLean-Hunter Publishing Company gave an enlightening talk on the importance of the business press to Canada as well as the future of Canadian industry.

December 11:

Dean Fetherstonhaugh, M.C., B.Sc., M.E.I.C., F.R.S.A., D.Sc., of the Faculty of Engineering and Architecture, University of Manitoba, and President of the Engineering Institute of Canada, gave a general talk on the E.I.C. and what it has to offer to the graduating engineer.

February 12:

The United States Steel Export Company presented an exceedingly interesting film "Steel Man's Servant" to a capacity audience in the main lecture hall in the Physics Building.

February 19:

The guest speaker for this meeting was Mr. John Webb who gave both an interesting and inspiring talk to the Engineering Society in Convocation Hall. The subject was "How to get Ahead in the World."

February 27:

The annual "Election" meeting was held in the main lecture hall of the Physics building. Candidates for office during the 1946-47 session gave forth with their best in campaign speeches.

March 1:

Election day at S.P.S. General meeting was held at the Palace.

March 13:

Mr. W. L. Davidson, Chief Executive Engineer of General Motors Corporation, Detroit, Michigan. "An Automotive Engineer Looks Into the Future", was the theme of the lecture presented to the society.

The subject as presented by Mr. Davidson in his own humorous style was most enlightening and entertaining.

THE BIRTH OF THE OLDEST ENGINEERING SOCIETY IN CANADA THE UNIVERSITY OF TORONTO ENGINEERING SOCIETY

By T. Kennard Thomson, S.P.S. '86

IN THE SUMMERS OF 1883-4-5, I WAS FORTUNATE IN HAVING A JOB on the Construction of the Canadian Pacific Railway, starting at Medicine Hat, Alberta, in May, moving to Calgary in September, —next summer, at the Summit of the Rockies, Where Summit Lake is drained; by the Bow River, etc, to the Hudson Bay; and by the Kicking Horse River, etc., to the Pacific Ocean. I then moved to camps in Kicking Horse Valley, and finally to the West Slope of the Selkirks. My first Chief was Walter A. Doane (1854-1940), Member Am. Soc. C. E. Mr. Doane was as fine a man as ever lived with no peer as a designer of wooden bridges, of his time.

The reason that I mention Mr. Doane here, is because he very kindly loaned me his copies of the Engineering News, (I have examined every page of that Periodical ever since), and the Proceedings of the Am. Soc. C. E., with the result that I realized the value of that Society, and also that of the Institute of Civil Engineers in England; and the fact that Canada had no Engineering Society.

The result was:—In the Fall of 1884 I asked one of the 1885 Class men about starting the Engineering Society of the University of Toronto. He said that we did not have enough *graduates*, at that time, to start such a Society. I appeared to drop the subject, and a few weeks later, had the nerve of a Youngster, to invite Principal John Galbraith, afterwards Dean; Professor, Dr. W. H. Ellis, who succeeded Galbraith as Dean of S.P.S.; the undergraduates of the 1885 and 1886; four old U.C.C. friends:—David T. Symons, now K.C. in Toronto, the late James Edmond Jones, afterward a fine City Magistrate, the Late James D. Thorburn, who became a famous Physician; the Late Wm. E. Burritt; and the Late Ab. Arnold; to a dinner. Twenty-five honoured me by attending. The Dinner was held on Hazelton Ave., where my three unmarried sisters and myself, were keeping house. Only one of the three is now living.

None of my guests knew why I had invited them, until after the coffee, when I suggested founding the University of Toronto

Engineering Society. If I had not been honoured by the presence of Principal Galbraith, undoubtedly there would have been many speeches, pro and con, then some one would have suggested that we adjourn to have another meeting, which would have killed the project for years to come, or long after the founding of The Can. Soc. C. E.

But that Great Man, John Galbraith, at once rose, said "that it was a good idea which ought to be carried out by electing a Committee then and there, to draw up the Constitution and By-Laws." The Committee then appointed consisted of Chairman Bruce A. Ludgate '85, the Most outstanding Undergraduate then in the S.P.S. He headed his Class for three years; J. F. Bleakley '85 and T. K. Thomson, '86.

So the two men who deserve by far the most credit, for starting our Society are *first*, Principal John Galbraith, and *second* Bruce A. Ludgate, who was also the first Vice President,—My Class Mates: the Late E. B. Hermon, and the Late Robert Laird, Henry Grattan Tyrrell, now of Baltimore; and most of the Undergraduates and Graduates of that time, were a great help. Especially our beloved No. 1, Dr. James L. Morris '81; Life Member Dr. George Herrick Duggan '83; and Life Member W. F. Tye, who did not graduate, as he did not want to leave his work on the C.P.R. He afterwards became Chief Engineer of that Railroad, and a top notch President of the Canadian Society of Civil Engineers, 1912.

Our Society and our Alma Mater would be honoured by having Tye's name enrolled on its permanent Lists.

John Galbraith, whose Name I always have and always shall venerate, was a Man and Engineer, who has never been excelled. He founded the S.P.S. in 1877. In recent years I have heard Presidents of other Universities explain the "great innovations" they were adopting—but every one of which was launched by John Galbraith in 1877. He made the School Term 6 months, so that his Students, by getting employment in the summers, would profit more from the lectures in the winters. He advised us not to try to get a Life Job the day we graduated, but to move around for ten years, to find out what we were best qualified for. He said that he was not trying to turn out full fledged Engineers, but merely trying to teach us how to study, as each new job is a study by itself.

In 1885, I had plenty of spare time in the Drafting Hours, so, I had the honour of making many plans for the Professors, and others; one was a tracing of a map, made by Principal John Galbraith, of a

canoe cruise that he took in 1883. At one point he noted:—"this place is undoubtedly very rich in minerals." Twenty years later, 1903, the Mineral Wealth of Cobalt was discovered at that point. His able son, Major John S. Galbraith still has that tracing. A large book would not be sufficient to do justice to that great Man.

IF THERE HAD BEEN NO JOHN GALBRAITH, THERE WOULD HAVE BEEN NO S.P.S. AND NO U. OF T. ENGINEERING SOCIETY.

Bruce A. Ludgate '85, honoured us by attending the Wonderful Semi-Centenary Celebration that our exceptionally fine President of that time, Wm. M. Lawrason, '36, made such a success of —at The Royal York, on Feb. 21st, 1936, also attending that Celebration, Lunch for 1000, and small dinner, were David T. Symons, K.C., Toronto, where he still practices, and Magistrate, James E. Jones. (Since died).

LUDGATE, SYMONS AND JONES RECALLED THE FACT THAT THEY HAD ALSO ATTENDED THE DINNER IN NOVEMBER 1884.

The first Transactions, Vol. 1, published in 1887 stated:—that our Society was founded in 1885,—where the Editor obtained his incorrect information I do not know,—as the Society was really started in November 1884 as shown above.

Our first Life Member Doctor George Herrick Duggan, Hon. Member Am. Soc. C. E., President of The Canadian Society of Civil Engineers in 1916, made a great impression on me when I first saw him in 1877, which impression has grown steadily ever since. I do not think that he has five equals, as a Man, Engineer, or Executive. He has also been a great Yachtsman, designing his own boats, and always winning when he sailed them. There is no man living whom I have known longer than Duggan.

We insisted on Principal Galbraith being President for the first four terms, but he insisted on H. E. T. Haultain being elected for 1888-89, who proved to be a very able first Undergraduate President, and is still one of the Society's best friends, with an International reputation as a Mining Engineer.

You will note that I do not say "the first Student President" for I remember Dean Galbraith's advice, and having graduated 60 years ago this April, I hope to be a student for another 20 years.

The Constitution and By-Laws drawn up by Chairman Bruce A. Ludgate and his Committee in November 1884 stated:—that all who had paid dues for three years, automatically became Life

Members. The List of Life Members published in April 1907 gave 251 names. That List contains many great names and at least 20 names of Engineers not graduates of our Alma Mater, as our Society decided to accept Provincial Land Surveyors, and other Eminent Engineers when they requested permission to join.

Among other Life Members is Henry F. Ballantyne S.P.S. '93, now of Ottawa, an oustanding Man and Engineer, always very loyal to our Society, and he probably has one of the few complete sets of our Transactions.

In 1907 we were asked to release the Society from the expense of sending us The Transactions, so I have paid for mine ever since.

Then many thought that the Society was or is an *Undergraduates Society only*, and omitted publishing the List of Life Members, containing many prominent names. But the Society was not founded as an Undergraduates Society only, as the List of Life Members proves.

It was with great pleasure that I heard that Great Executive President, Murray D. McCulloch, state at the 60th Anniversary Dinner, held in the Hart House, on November 2nd, 1945, that: He expected the printing of Life Members in The Transactions will be renewed, which I am sure will be of much benefit to both the Undergraduates and the Graduates.

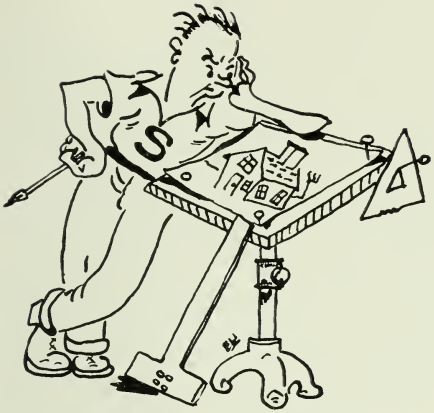
Allow me to take this opportunity to congratulate the University of Toronto Engineering Society, the Oldest Engineering Society in Canada, for having such an unusually fine President this year, as President Murray D. McCulloch, and to personnally thank President McCulloch for the great honour he did me, and for the great pleasure I had in meeting so many Past Presidents, other Members, Ladies, and honoured Guests, on that occasion.

Whenever any S.P.S. Men from 1881, to as long as I live, come to New York, I hope that they will honour me by calling on me at The Engineers' Club, except Saturdays and Sundays, and I hope when they do, I will not be out of town.

Again let me hope that You, Your Wives, and Descendants, for ever and ever, will each, one and all, enjoy Life until reaching a ripe old age and then some.

God Bless You.

IS TOIKE OIKE IRISH?



THE BOYS HATED TO LEAVE
THE DRAUGHTING ROOM

School graduate of the Class of '93 ascribes the famous words to an irascible caretaker

THE ORIGIN OF THE SCHOOL YELL HAS STIRRED UP CONSIDERABLE interest among graduates. From Ottawa, Henry F. Ballantyne of the class of '93 writes:

"Though not having given much attention to University affairs for a good many years, I received some time ago a copy of the February Alumni Toike Oike which was read with interest. I noted those of the old timers who were present at the Annual Dinner, and was pleased to see that Dr. J. L. Morris '81, was again present, but sorry there was no one to represent the class of '93.

I was particularly interested in the article on the "mysterious Toike Oike" and was rather surprised that no one seemed to have any idea as to the origin of the words "Toike Oike," if words they may be called.

In 1890 the newer portion of the School of Practical Science building was completed and ready for use. The little Old Red School House facing the campus was very much in eclipse but the new building was a very definite spot of color on the landscape and was referred to, by at least one editor of the Varsity as Gailbraith's Factory.

In October 1890 when I reported at the S.P.S. as a member of the class of '93, the late Professor C. H. C. Wright was one of the

new and younger members of the enlarged faculty of the School while a ruddy complexioned somewhat irascible Old Countryman by the name of Graham was caretaker of the building.

Graham seemed firmly of the opinion that the students should quit work and shut up shop precisely and on the drop of the hat at five o'clock. When quitting time came around, he was sure to appear regularly, Monday through Friday, with his favorite theme song, "five o'clock gentlemen."

Five o'clock closing was not always popular with the students, particularly the freshmen who were not familiar with the Graham System. Friction sometimes developed with the men who were behind in their drafting room work and wanted to catch up overtime.

On one such occasion, in commendation or otherwise, Graham referred to someone named Murphy and said with his own special accent, "take ye Ike Murphy." Who Murphy was I do not know, but the rest of the sentence sounded like toike oike. Toike Oike caught the fancy of some of the fellows who began to repeat it among themselves. To have persisted for so many years, Toike Oike must have a had strong appeal to the Applied Science and Engineering students and doubtless was familiar to them when the new school yell was launched Hallowe'en 1897, as related by Mr. Monds. That the new yell was launched with such success would seem to confirm the belief that the strange new words were already well known to the student body.

This explanation of the origin of Toike Oike was given to me many years ago by Professor Wright and, I think, may be taken as correct. Professor Wright was a member of the Faculty when Toike Oike was started. He was still a member of the Faculty when the new yell was launched and for many years afterwards, and had every opportunity to know what was going on.

My own belief is that Toike Oike started with the class of'95 or '96. I have some recollection of hearing some of the junior classmen experimenting with the early beginnings of the novel new school yell.

Maybe some member of one of the classes of the middle nineties can confirm the above story and fill in some of the details which are unknown to me, as I left the School in 1894.

From the above, it would appear that Toike Oike is of Irish origin rather than Chinese or Japanese; also, I understand the pronunciation is Toikie Oike. Why should it not be spelled that way?

THE ENGINEERING SOCIETY

A Speech that was not Delivered November 4th, 1945

YOU HAVE ALL HEARD THE EXPRESSION, "YOU CAN'T SEE THE woods for the trees." There are so many interesting trees all around us, so many people and actions and interests that we fail to see the broad picture.

A certain amount of detachment comes with retirement from routine responsibilities. Let me tell you something about the general picture of yourselves as I see it.

You are the oldest Engineering Society in Canada. That is something distinctive. Something to be proud of, proud in a right way as carrying responsibilities. Paradoxically you are one of the youngest in that your active membership is young, young in years and very young in the responsibilities of membership. You are 60 years old in accumulated tradition, but you have all the enthusiasm and vigor of youth. A unique and valuable combination, one with good possibilities of usefulness and also with possibilities of uselessness—yes—and even of abuse. Your record through the 60 years has been good, remarkably good, but not uniformly so. Perhaps we needed the experience of some bad years to warn us of some pitfalls. But the general batting average has been high, and it is not easy to account for it, especially when we listen to the talk of the irresponsibility of youth and see some of the foolish, very foolish things that individual youth may be guilty of. Let me suggest an explanation. You are a tribe and your record is based on your tribal actions. We used to hear more about the theory of recapitulation than we do today. This theory began by saying that during the foetal stage the human physical organism passed through all the stages of physical evolution from the very earliest stages up to the advent of the man animal. There is much sound evidence to support this. Later the theory was extended. It was shown that from birth onwards we passed through the various stages of primitive man's development as man in his relations with fellow-man, the stages of primitive man, early and later savage man, the earlier and later barbarian stages, and so on to civilization.

Our earliest unit of co-operation was the single family and through long periods we progressed through larger and larger family

groups and then to tribes, and then to nations and to empires. The tribal period was a long one, it was the period in which we learnt to get on with our fellows, learnt that the general good of the tribe was more important than the individual. We developed the value of tradition and of tribal pride. There were three outstanding things that we learnt. The value of good leaders, the instinctive ability to choose these leaders, and the duty of loyalty by the individual to these leaders when chosen by the tribe. Look through the trees at yourselves in this larger picture.

Your own little tribe is 60 years old, but your characteristics were developed through periods of time measured in hundreds of thousands of years, and are just as much a part of your tribal behaviour as the universal love of the open fire, or the appreciation of the smell of wood smoke or the taste of scorched meat, or the disgust at certain smells, all of which have an ancestry older than your tribal spirit.

During the long period of the growth of the tribal ideas and methods of behaviour, we were still under the influence of that dominating something, that had persistently tended towards stabilization of physical characteristics in a species, that had kept the lion a lion, and had also stabilized the behaviour within the species as exemplified in the hive instinct of bees. During the long period of tribal development we depended on tradition and unthinking instinct, we were comparatively free from analysis and introspection. These came with the growth of intellect, that man-characteristic which is supposed to be his greatest improvement over the animal. This apparently tended to work in the direction away from stabilization, and as a result we are today in the throes of a chaotic stage in man's development. But your Society is in the tribal stage and what does that tell you? Does it not say that therein lies your stability and your strength? Does it not say confine yourselves to tribal affairs, trust your tribal instinct, depend on yourselves, live up to your tradition? I believe in doing this you will make your greatest contribution to the University, and to the profession and what is this contribution—it is influence—a subtle influence, a leaven that leaveneth the whole lump. There are two forces emanating from any individual or group, influence and jurisdiction, and often, very often, influence is greater and more far-reaching than jurisdiction. We are learning more and more that suggestion is more powerful than command. You have no jurisdiction in University affairs, better not seek it, but you have influence both for

good and evil. Your influence may be greater, in some respects more persistent and penetrating than the influence of the bodies whose main function is jurisdiction. Your influence is not confined within the University buildings and grounds. Our School spirit was born and has been developed in the Engineering Society. As the boy is the father of the man, so is the Engineering Society the forbear of the Engineering Alumni Association. What more would you wish?

H. E. T. Haultain.

CANADIAN ENGINEERS' CONTRIBUTION TO VICTORY

General A. G. L. McNaughton, M.E.I.C.

ADDRESS DELIVERED TO A JOINT MEETING OF THE DETROIT Section of the American Society of Mechanical Engineers and the Border Cities Branch of the Engineering Institute of Canada, published in *The Engineering Journal*, November, 1945.

CANADA'S PART IN THE INCEPTION, DEVELOPMENT, AND PRODUCTION OF THE NEWER AND BETTER WEAPONS

I am to speak to you to-night about some aspects of science and engineering in the war, particularly with reference to the part taken by Canada in the inception, development, and production of the newer and better weapons and equipments with which to out-match the enemy in battle and thus to give our troops in combat every possible advantage.

In the course of my remarks I will venture a few observations both on what is past and the difficulties and the dangers which were overcome or evaded, and on what I think the future probably holds; and I will endeavour to draw attention to certain vital matters which I think it is important that we should not again overlook.

It has been shown by experience that, granted time, we have the technical abilities and the physical resources to create the best of armaments. It has been shown, and proved conclusively, that we can have whatever we have the will and purpose to provide. So it is in the realm of policy and direction that we have to be particularly careful.

It is understood, of course, that what I have to say represents my personal opinions only for I have retired from the Canadian Army and, on the conclusion of active operations in the war, my resignation as Minister of National Defence in the government of Canada has been accepted. The only official position which I hold at present is that of Chairman of the Canadian Section of the

EDITOR'S NOTE: *In beginning his address, General McNaughton expressed his appreciation to the president and members of the American Society of Mechanical Engineers for the honorary membership in the Society conferred upon him in September, 1943. He then turned to the actual subject of the address, the text of which is reprinted here as delivered by the speaker.*

Canada-U.S. Permanent Joint Board on Defence, which deals with the co-ordination of general defence matters between our two countries. These matters are, of course, outside the scope of my subject to-night, except that I would like to say to this representative body of engineers from the United States, and from Canada, that I have a very deep sense of the importance of the work which has been entrusted to that Board to our mutual advantage as we go forward side by side into the future and face the great problems which will undoubtedly arise and which will require solution.

The Position of Canada in the British Commonwealth and in America; in Regional and in World Security

War is the continuation of national policy when peaceful means have broken down and so it follows that armament and national policy are very closely interlinked. In consequence the requirements which condition the provision of arms are intimately dependent on the position of the nation in relation to others with which it may be associated.

Canada is a member of the British Commonwealth and she holds to that association with all the firm conviction which has marked the course of our history since early times. She holds to that association, not as any dependent colony of a central authority in London, but as a nation in her own right, happy to co-operate in all matters which make for peace and orderly progress in the Commonwealth, and in the world; but with intention made clear to all that she will make her voice heard in deciding the objects of that co-operation, and that then, she herself, will determine the form and scale of the action she will take—that her decision in these matters, so far as human judgment runs, will be based on the realities of the situation and the best interests of all concerned—her own included.

No one who has ever had close experience of the actual working of inter-Commonwealth relations will question that all matters will be dealt with objectively by Canada, or will doubt that worthwhile causes will be supported; and that the effectiveness of this support, when given, will far transcend anything which might have been considered possible in the older outmoded Imperial form of organization from which our present constitutional position has steadily evolved down the years.

But Canada is also a nation of the American continent and as a consequence we share many interests with you—interests which under modern conditions continue to develop with ever increasing acceleration particularly in matters of defence where, with the remarkable progress in the application of science to war which we have witnessed during the last two decades, distance has lost its former attenuating effect on the problems of international relations. We must realize that continents have now become the geographical units in which most questions, both of peace and of war, must be stated and that effective arrangements for the defence of the territory of one nation has become a matter of vital concern to all other nations of the continent.

There are some who see a difficulty in reconciling our position as a nation on the American continent with our membership in the British Commonwealth, but I do not share this anxiety.

In the first place I believe that fundamentally the real interests of the member nations of the British Commonwealth are very close to those of the United States. In the second place I think we are a practical people ready to deal with each question as it arises on its merits and on the basis of the facts. We see no fundamental reason for conflict in interest and you can be quite sure, with our deep concern for the welfare of each of these great associations of peoples with whom we are so intimately linked, we will devote ourselves on every occasion to promoting unanimity in view.

It is very satisfactory to note that in the steps taken at San Francisco towards world organization provision has been made for developing security on a regional as well as, perhaps more remotely, on a world basis. Both are important and whatever we can do to promote the one will also help in the other.

The Supply Situation in Canada on the Outbreak of War in September, 1939

In September, 1939, within a few days of the outbreak of hostilities in Europe, Canada declared war on Germany and associated herself with the United Kingdom in the struggle with the Nazis. Mobilization was ordered and before Christmas we had an Infantry Division and other troops overseas in Britain. Apart from clothing, and a few articles of a commercial type, which could be used we depended for equipment on the arsenals

there, or on the reserves of armament which had been salvaged from the first World War. Most of these were of obsolescent type.

It was not an enviable position as we soon confirmed that the supplies available in Britain were very meager to say the least. There was little help to be obtained from Canada immediately for in the interval between the wars we had completely demobilized the munitions industry which had been built up to considerable proportions in World War I.

Physically this was about all; and anyone unfamiliar with our country and with its potentialities must have thought that we were very rash indeed to go to war and launch an expedition overseas.

But this was most certainly not all, for while in peace we had been denied the opportunity to develop our arsenals to any reasonable extent, nothing could prevent our thinking about the problem and making plans. We had been able to make a close survey of our manufacturing industries and of our sources of supply for various industries and of our sources of supply for various materials needed. This had shown that our industrial facilities were very widely diversified and highly efficient; that, given time, there was probably no article of war supply which we could not make in adequate amounts for our own purpose with something over for our Allies as well. We had the steel and the coal and the non-ferrous metals and the light alloys which had become of very great importance—we had the nucleus at least of a machine tool industry—we had potentially the labour and the trained mechanics and the engineers.

The problem was one of adaptation rather than of creation and so, granted decision and energy in execution, it could be solved within the time we thought might be available.

Moreover, this was not the unsupported opinion of our military officers alone, for in the summer of 1939 a group of our industrial leaders under the auspices of the Canadian Manufacturing Association had gone abroad and familiarized themselves with possible war requirements; these they were confident they could fulfil.

So also in the vital matter of the application of science to design and production for war the unique facilities of our National Research Council had been geared into our Defence departments and were available to undertake the tasks required with many of which the technical staffs were already at least partially familiar.

Further, as an added reason from which we could draw confidence we had the factual record of the immense results

achieved in the production of munitions in Canada during the first World War once the dead hand of absentee control had been suppressed and the initiative of our manufacturers had had some freedom to express itself.

It is true that our production then had been primarily confined to the simple types of gun ammunition, training aircraft, and the like and that we had been content to take the designs and specifications which had been given to us from England; but a study of the history of this effort had shown up some very significant facts which were most encouraging for the future.

In the first place, it was clear that the application—even to the limited extent permitted—of the North American technique of mass production had increased the rates of output manifold over what had been expected under the methods of British industry then current; the costs as measured in money or in man hours had been decreased very remarkably.

In the second place, in the most important matter of quality the record had been superb; and further in the later years when the industry had got well underway there was clear evidence that our engineers had not rested content with the routine of production but had shown initiative and inventive capacity of a very high order.

Before the First Division sailed from Canada contracts had been placed for all the motor transport required; designs and proto-types were available. Here, in this city of Detroit which is so closely associated with our own motor industry, I wish to pay my tribute to what was accomplished. By the early spring of 1940 when we were due to cross from England into Europe to join the British Expeditionary Force under Lord Gort's command the many thousands of vehicles required had been delivered to us overseas mostly from our own plants in Canada. Going on from there throughout the war we received in an unending stream new designs quickly evolved to meet new needs as they became apparent.

I say to the men of the Canadian motor industry, and to you here who have helped us so much, that this early performance was most heartening and encouraging—it was right up to expectations, not only in the quantities delivered, but even more important in the excellence of the product.

I wish I could say the same for other matters of supply but in most things before these could be arranged those in authority

overseas seem to have got the idea of a "phoney war" and there was delay and apathy in placing orders which was not broken until the rude shock of the fall of France brought every one to their senses and to realization of the dire peril in which we stood. Then Canada really did get going.

The Period of Improvisation in Britain for Defence

Overseas meanwhile we had managed to get the First Division fairly well equipped but with the greatest difficulty and we certainly had enough experience with obsolete and unsatisfactory armament to rub in the lesson of the need of new and more appropriate designs; but in the imperative necessity to give all attention to organization and to training there was little that we could do to improve matters at that time.

In the battle of France we had one essay across the Channel when we were sent to support an army which did not exist except in the imagination of a crumbling government and then we had to withdraw with more haste than dignity.

In the retreat from the continent of Europe the British Forces had lost most of their equipment, armament, munitions and reserves and there was very little available in the United Kingdom for the reason that during the "phoney war" most things had been sent forward as they were made to depots in France and these had been overrun before they could be moved.

In the Battle of Britain, even in rifles, we were to begin with tens of thousands short for the actual numbers of men in the units. So perforce we were driven to improvisation.

There were few anti-tank guns so we had to imitate David but the missiles to be thrown were not "the smooth stones out of a brook" with which he had disposed of Goliath, but bottles of phosphorous and naphtha which burst into hot flame spontaneously on impact. I recall the great search made through the ancient manuscripts in the Bodelian Library at Oxford to ascertain the exact composition of Greek Fire which had last been used decisively in 1100 when Alexius of Constantinople routed a Pisan fleet by its use.

There were few anti-aircraft guns so A.A. mountings had to be improvised for light and medium machine guns and for field guns; and so on throughout the whole range of requirements.

We did not possess the modern weapons needed so something else had to be found to take their places. Explosive obstacles to surprise and destroy enemy tanks—trip-wires to wreck enemy planes and gliders attempting to land on any areas where this form of attack was thought likely—the whole business was very primitive indeed.

Even guns which dated back to the era preceding the South African War which had been placed in store by the thrifty Admiralty were taken out and pressed into use mounted on commercial vehicles of sorts with boiler plates for armour. They may not have been very effective but in their utter ugliness they looked formidable and that was something.

With great truth, through the long days of the summer of 1940, Britain was held largely by bluff for it is difficult to believe that any serious attack from across the Channel could have been effectively resisted.

I have mentioned these experiences to give point to the lesson that no nation can ever afford to neglect its armament. By being deluded into this path after World War I the Allies very nearly lost the last opportunity to redress the balance in Europe and so begin the series of great campaigns which finally brought us to victory. Certainly no Canadian who was there will ever forget this experience and I hope that the lesson will be well remembered by those who now have the duty to show pre-vision and who have the power to act.

The Period of Preparation for the Renewed Offensive on the Continent of Europe

Through all the summer of 1940 reinforcements came to us from Canada across the wide spaces of the North Atlantic as fast as ships could be found to transport the men and move their supplies. By the autumn the forces in the United Kingdom had grown to considerable dimensions and both British industry, and our own with your good help, were making the most strenuous efforts to correct the deficiencies in equipment and armament. By the early winter we could feel that Britain was a bridgehead over against the continent of Europe, reasonably secure, in which the vast potential forces of North America could be assembled in due course and we had FAITH that in proper time and season our sister nations on this continent would join us in the struggle.

We could lift our eyes from the immediate pressing problems of defence and contemplate again the time when we might strike back in Europe itself; when we could meet the enemy there again in open battle to seek a decision which would bring about his final defeat.

We could lift our eyes and give our thoughts to the plans and preparations that needed to be made. We could think out what we should do in order to make the best use of all the great abundant advantages which we had—or could have if we had the wit to turn them to account.

And what are these great inherent advantages for the making of modern war which are characteristic of the North American continent—both of Canada and of the United States?

Our young men are highly educated and naturally familiar with mechanism in all its varied forms—intelligent, resourceful, full of initiative, and responsive to leadership.

Great home countries are in active process of bringing their vast natural resources into use and engineers are skilled in the art and accustomed to the conduct of projects of the greatest magnitude.

Mass production industries of great variety, and most comprehensive, can take a new design and rapidly turn it out in any numbers needed and with the high precision which is required in the weapons and apparatus of modern war.

Industrial leaders of vision and resource are trained in the hard school of a developing economy—raw materials in abundance—with wide experience in engineering, in research and in developments of many kinds.

What we needed for the European attack was the most highly mechanized army which could be created, equipped, and trained in the limited time available before this great endeavour could be launched. Certainly in 1941 we had at least two years; quite possibly more.

We needed armour and engines for employment in the field. We needed new and better mechanical vehicles to give us facility for rapid movement and to transport great masses of equipment over great distances. We needed new and better weapons of greater power and range and more precision in the accuracy with which they could be directed on the vital points within the enemy's dispositions. We needed new and better propellents for our guns. We needed new explosives of more intense character to shatter

the enemy's fixed defences of concrete and steel and to penetrate the heavy armour of his tanks and other fighting vehicles. We needed better cameras and optical equipment to detect and locate his works for defence and offence and overcome his camouflage. We needed better gear to track his aircraft and bring effective gunfire against them in the few split seconds that they might be engaged. We needed means to create new airfields with the utmost rapidity close up behind our advancing armies so that they could continue to enjoy that intimate air support which had become essential. We needed docks and wharves to turn an open beach into a port and bridges to cross the many large rivers that lay across the path of invasion into Germany. We needed amphibious vehicles to facilitate the landing and the negotiation of streams and swamps and other water obstacles. We needed to ceaselessly experiment with all this new gear to work out and evolve the form of organization and the methods which could best be used.

We could spend material in the most generous profusion to bring about the enemy's defeat and it was right to do so to save the precious lives entrusted to our care.

Much of this great work of experiment and development had gone on in the Canadian Army as opportunities were made throughout the period of the Battle of Britain. There had been the closest co-operation with the various British authorities and with their encouragement progress of considerable value had been achieved in many lines which we had undertaken as our share in the general effort.

For the supply of the vast assortment of the material required we had to look principally to North America. The factories of Britain were under air attack and subject to serious interruption.

Available labour was scarce and urgently needed for maintenance and other purposes and, most important, we had learnt from hard experience that designs worked out in the British industrial environment were often unsuitable for mass production according to the North American technique. Screw-threads differed—rivets spaced for insertion by hand could not be placed with our automatic machines—and we literally could not do in quantity the elaborate hand fitting which was the customary practice in the British Isles. Even technical terms had different meanings on either side of the Atlantic and some there who were

opposed to new devices for they threatened the supremacy of established interests.

It was necessary therefore, if unfortunate delays were to be avoided—as they had to be—that detailed designs should be developed at home and that those who were overseas should content themselves with giving the general idea of what was wanted together with the most complete "user specifications" that they could define.

By early 1942 we were in the closest touch in the United Kingdom with representatives of the American Army and the results of all our trials and experiments were given to them without reserve. In return we had their welcome collaboration and their valued advice and help.

In Canada the need for newer and better weapons had also been recognized; an organization for development had been established and great efforts were being made to translate our requests into models with which we could experiment. Here too the closest touch had been established with the U. S. Army and U. S. industry so that all facilities might be developed for the common purpose without duplication or waste of priceless time and effort.

In the tank, for example, our engineers in Canada took the M.3. and from it evolved the Ram, which in its turn contributed to the M.4., the Sherman, the tank which we used with every satisfaction in operations from 1943 onwards. We had well founded confidence in it, for we knew that it incorporated the features to which we attached special importance and we had had the opportunity to test and comment on its performance from the days of the earliest models.

As another example of the close association between Canada and the United States which came about I mention radar. Our National Research Council had been early in the field with the C.R.D.F. and some purely scientific investigations on the height of the Heavyside layers and this gave the background for immediate progress when early in 1938 the suggestion came from England of the vital importance of tracking enemy aircraft while yet they were at great distances so as to have early warning of attack. As a result we were able during 1941 to develop a design of reasonable importance and in 1942 we had the great satisfaction of turning over a considerable number of these sets to the U.S. Army for their use at a time when the requirement was very

critical. I can assure you we were very happy indeed to make this contribution in what was then a very new and novel art.

The radio fuse is another example of the flexibility and co-operation between our two countries which came into being. The first developments in Canada were started at the University of Toronto in 1940 and the early activities of our two countries were closely co-ordinated later as it became evident that the special and extensive facilities required for rapid progress were to be found only in the United States. The Canadian effort was restricted to a few special phases of the problem and the Canadian scientists who had been working on it came under American direction.

In the mechanization of flame warfare—in new methods to smash armour—in new ways to pass through minefields—and in countless other matters of great import the story is the same.

A case of special merit is exemplified in the organization for the study of chemical warfare and of the other similar methods to compel an enemy to comply with our will. The Canadian and the U.S. laboratories were hardly distinguishable from one another and the staffs from one country moved without restriction in the establishments of the other and common use was made of all the testing grounds and other facilities wherever located.

I have mentioned these few examples from among the many to show the close integration which had been achieved in the development of war equipment. In the result and thanks to mass production, and the most careful standardization, our armies were given in full supply the best that could be devised of everything required.

For the invasion of Europe they were the most perfectly equipped of any armies which had ever gone to war. They had attained the highest standard in the application of mechanism to ease the task and multiply the power and speed and range of man—to conserve life and to aid and facilitate the completion of the tasks which had been entrusted to them.

Lend Lease and Mutual Aid

Not the least of the matters of importance in connection with the arrangements for the equipment and maintenance of the Armies, both yours and ours, has been the method by which the financial costs, running into astronomic figures, have been met.

We each have had the problems not only of paying for everything which our own armies required across the whole range of costs from guns and aircraft to clothing, food, and medical supplies—but we also have had the problem of providing for the costs of what we placed in the hands of Allies for their armies, and for their civil populations as well, so that they might be enabled to do their part without the accumulation of continued debts which could not be liquidated and which would embarrass both them and us in the period of post-war reconstruction.

You solved this problem by "Lend-Lease" and we by the similar procedure of "Mutual Aid". It is a source of great satisfaction that Canada's effort in these matters has been entirely self financed. We accepted no monetary aid from anyone and on our part we saw to it that no burden of debt was placed on those we sought to help.

The measure of this help, which we were glad to give and bear, runs to amounts expressed in thousands of millions of dollars—amounts which have been, or will be, met by the thrift and savings of the Canadian people both during the war and in the period which now follows.

And so at last we come to Victory, decisive, all embracing, and complete, and in this long sought result the scientists and engineers of both our countries and from Britain across the sea—the men responsible for design and production—can take the greatest satisfaction in the contribution which they have made. We started with very little and in a position far inferior to our enemies. We quickly overtook and then surpassed them, not only in the equipment actually in use, but in every new line which they had visioned into the future.

As one who watched these matters with close attention, and very anxious interest, throughout the war, I express my sincerest admiration at the achievement.

Conclusion

The note on which I wish to end is not one of complacent content, for in the world to-day we cannot afford to rest. We have gained victory but it is yet to be confirmed through the organization of security and of the will to use force, if needs be, to maintain peace. It is a vital requirement that the Allied Nations who think with us remain collectively the strongest

military force on earth, and each and every one of us must make our contribution to this end.

We have entered, and are far along, into the period of the application of science to war and the rate of acceleration makes the arms of today of lessened value for tomorrow. Already we have the atomic bomb, a decisive weapon in this year and day of grace, but it as well represents nothing more than a transient advantage unless we maintain our lead; for the means to counter are already clearly in sight.

If we are to retain our place as the wardens of peace the most important thing we have to do is to maintain our research and development, to continue to produce the newer and the better weapons, at least in proto-type, and to ceaselessly experiment to master the technique of their employment.

In this great task I earnestly hope that Canada and the United States will long continue the satisfactory and fruitful collaboration which they have achieved in these matters.

Hart House

ATOMIC POWER

B. W. Sargent

Head of the Nuclear Physics Division at the Montreal Laboratory of the National Research Council

Paper presented before the Montreal Branch of the Engineering Institute of Canada, and published in the Engineering Journal of December 1945

. . . "AT THE APPOINTED TIME THERE WAS A BLINDING FLASH lighting up the whole area brighter than the brightest daylight. A mountain range three miles from the observation point stood out in bold relief. Then came a tremendous sustained roar and a heavy pressure wave which knocked down two men outside the control centre. Immediately thereafter, a huge multicolored surging cloud boiled to an altitude of over 40,000 ft. Clouds in its path disappeared. Soon the shifting substratosphere winds dispersed the now grey mass."

Such was the description, according to the Smyth report, of the explosion of the first atomic bomb in the desert of New Mexico on July 16th last. This tremendous release of energy, capable of making a crater hundreds of yards in diameter and of turning the sand of the desert into molten glass, was the culmination of the efforts of a vast body of scientists working on a two billion dollar project.

A comparison of the superexplosive with coal might be made at this point. The amount of energy released in the form of heat by the combustion of one pound of coal is approximately four kilowatt-hours. The amount of energy released per pound of the active ingredient of the atomic bomb is approximately ten million kilowatt-hours. Thus pound for pound the new source provides two and a half million times more energy than the combustion of coal, while atom for atom the new source turns out to be fifty million times more effective than the combustion of coal.

Great and spectacular as the scientific effort over the period 1940-1945 was that led to the atomic bomb, it could not have been achieved so rapidly had there not been a vast body of knowledge built up over the preceding forty-odd years. The field of nuclear physics was opened with the discovery of radioactivity

by Professor Henri Becquerel in 1896. When we look back on the history of nuclear physics we think of Becquerel and Pierre and Marie Curie of Paris, Rutherford of McGill and later of Manchester and Cambridge Universities, Einstein of Berlin, Bohr of Manchester and Copenhagen, Cockcroft and Walton and Chadwick of Cambridge, Lawrence of California, Fermi of Rome, and many others.

In atomic bombs and atomic power we have the world's best example of science regarded for a long time as purely academic turning out to be applied. For four decades nuclear physics grew slowly in quiet university laboratories, while industrial laboratories ignored it. While the professors of the subject had realized for a long time that nuclei were a vast storehouse of energy, the difficulty of getting more energy out of the storehouse than was required in breaking into it was regarded as very great if not insurmountable until 1939.

In view of the source of the energy, the current terms "atomic bomb" and "atomic power" might well be replaced by the more exact terms "nuclear bomb" and "nuclear power".

The First Evidence of Nuclear Energy-Radioactivity

Let us now consider some of the details of the story. The phenomenon called radioactivity was discovered as a property of uranium. Shortly afterwards the Curies discovered through its radioactivity a new element, which they named radium. The list of radio active substances was rapidly extended by Rutherford, Soddy, and others. The property of certain heavy elements that we call radioactivity is the spontaneous emission of electrified particles. Some of these elements were found to emit beta rays, which are electrons travelling at high speed, while other elements were found to emit alpha particles, which were subsequently shown to be helium nuclei travelling at high speed. The emission of these electrified particles is often accompanied by gamma rays, which are similar in nature to X-Rays. These particles are now known to be chips thrown out by the nuclei of these particular substances, and, since the chips are travelling rapidly, they possess energy, which has been derived from their parent nuclei. It was early shown that high pressure and high temperature had no effect whatever in speeding up or slowing down the rate of emission of these particles.

A Picture of the Atom

Let us examine more closely what is meant by the words "atom" and "nucleus". In 1911 Rutherford proposed a picture of the atom that is still more or less held by scientists. The word "atom" is of Greek origin, and arose from the idea that, if a piece of matter were subdivided over and over again into smaller and smaller pieces ultimately one would arrive at a piece that could not be further subdivided or capable of being cut. Rutherford's picture of the atom was very different. He supposed that the atom is made up of a hard central core or nucleus surrounded by a number of electrons moving in orbits. This scheme calls to mind the solar system, and possibly the thought of the latter did prompt Rutherford. The relatively massive nucleus plays the role of the sun around which the light electrons move in orbits similar to the planets.

The essential points of Rutherford's theory are that the nucleus is extremely small and contains most of the mass of the atom, and that it possesses a positive charge of electricity equal to the total negative charges of electricity of the circulating electrons. On this view most of the volume of the atom is empty space.

We ascribe to the atom an atomic number Z, where Z is the number of positive charges on the nucleus, and also the number of circulating electrons in the neutral atom, each positive charge being equal to the charge on one electron. We also ascribe to the atom a mass number A, which may be associated almost entirely with the nucleus since the mass of the electrons is relatively negligible. It is convenient to choose mass numbers relative to 16, which is the mass number of oxygen.

Let us take some examples. The simplest atom is hydrogen, which consists of a nucleus called a proton possessing a single positive charge around which circulates a single electron. In symbols, the atomic number $Z = 1$ and the mass number $A = 1$. For helium $Z = 2$ and $A = 4$, for carbon $Z = 6$ and $A = 12$, and so on with increasing Z to the element uranium for which $Z = 92$. To this list of 92 elements there have been added recently the 93rd element called neptunium and the 94th element called plutonium. More will be said about these elements later.

Another element of interest in the present discussion is heavy hydrogen for which $Z = 1$ and $A = 2$. It will be noted that heavy hydrogen, discovered as recently as 1932, is twice as heavy as the

most common light hydrogen having the mass number one. These hydrogens in chemical combination with oxygen form light water and heavy water. Now water as found in rivers, lakes, and oceans is really a mixture of these two kinds of water, the heavy water being present to only one part in five thousand.

These hydrogens are examples of isotopes—atoms having the same atomic number Z but different mass numbers A. Recalling that the chemical properties of elements depend on the system of extra-nuclear electrons, it follows that two or more isotopes are chemically identical. Moreover, ordinary physical properties of isotopes, while not identical, are closely similar. Since any method of separating two isotopes must depend on differences in their properties, it is easily understood why the separation is so difficult and at best very costly. If pure heavy water is required as a moderator in a chain-reacting pile it is necessary to concentrate the heavy water starting with the very unfavourable one part in five thousand.

The second relevant example of an isotopic mixture is uranium. This element as found in nature consists of atoms of mass number 238 in amount about 99.3 percent, and atoms of mass number 235 in amount about 0.7 percent, and a negligible amount of 234. The roles played by uranium 238 and uranium 235 in a chain-reacting pile will be discussed later.

The First Disintegrations Produced Artificially

Before 1919 no one had succeeded in disturbing the stability of ordinary nuclei or by any known device had changed in any way the disintegration rates of those nuclei that were naturally radioactive. In 1919 Rutherford showed that high speed alpha particles could cause a change in the nucleus of an ordinary element. Specifically, he succeeded in changing a few atoms of nitrogen into atoms of oxygen by bombarding nitrogen with alpha particles. In this experiment, in which only a few hits were registered while using about a million alpha particles bullet, the alpha particle entered the nitrogen nucleus and knocked out a proton.

Discovery of the Neutron

Experiments of exactly this kind led to the discovery of the neutron in 1932. In particular, as the result of firing alpha particles at atoms of beryllium and boron, Chadwick concluded

that on rare occasions direct hits on the nuclei were registered causing a new kind of particle to be knocked out. This was named the neutron. It is uncharged and has about the same mass as the proton or hydrogen nucleus, that is, a mass of one on our relative scale. Specifically, in our notation, for the neutron $Z = 0$ and $A = 1$.

A Picture of the Nucleus

Two interesting points arose at once. One concerned the structure of the nucleus, which hitherto had remained a puzzle. It was natural to assume now that in general nuclei are built up of neutrons and protons, since Chadwick had shown that neutrons can be knocked out of certain nuclei and Rutherford had shown thirteen years earlier that protons can be knocked out of other nuclei. A nucleus with atomic number Z and mass number A would contain Z protons and A-Z neutrons. These particles are held together by electric forces with which is associated the latent energy of the nucleus.

The Neutron as a Bullet

The second point arose from the interesting property of the complete lack of charge on the neutron. Neutrons were expected to pass through atoms without disturbing or being disturbed perceptibly by the electrons and without being repelled by the charges on the nuclei as would be the case if alpha particles or protons were used as bullets. It seemed likely that neutrons would very easily get into nuclei and create such a disturbance that disintegration would take place. In 1934 Fermi and his collaborators bombarded a large number of stable elements with neutrons and found that many became beta active as a result of the capture of neutrons.

One example will suffice to illustrate these points. Let us consider what happens when a slow neutron is fired at a silver nucleus of atomic number $Z = 47$ and mass number $A = 107$. (The orbital electrons of the atom are omitted since they play no role in the nuclear change.) According to the current picture the nucleus of this stable isotope of silver is made up of 47 protons and 60 neutrons. When the oncoming neutron is captured the nuclear composition becomes 47 protons and 61 neutrons. This silver isotope is unstable, and it reverts to a stable nucleus when a neutron

transforms to a proton and a beta particle is emitted. This resulting nucleus contains 48 protons and 60 neutrons. In other words, the atomic number is 48, which identifies the atom as cadmium, and the mass number is 108.

If an uranium nucleus of atomic number 92 and mass number 238 captures a neutron as the result of a hit it becomes an uranium nucleus of mass number 239. This isotope of uranium is beta active and after disintegration with the emission of a beta particle becomes element 93, retaining its mass number 239.

It is now neptunium (Np). Neptunium is in turn beta active and transforms to element 94, retaining its mass number 239. The 94th element is plutonium (Pu).

The Discovery of Uranium Fission

The study of the bombardment of uranium by neutrons led to the remarkable discovery by Hahn and Strassmann and others, in January 1939, that the capture of a neutron by an uranium nucleus sometimes causes that nucleus to split into two approximately equal parts with the release of an enormous quantity of energy. This process is called nuclear fission. It differs from the previous examples of transmutation brought about by alpha particles and neutrons in two ways. The bombardment of materials by these nuclear bullets caused chips to be knocked off, while in nuclear fission we have for the first time a splitting of a heavy nucleus in the strict sense. Secondly, the energy released in the fission process and appearing as kinetic energy of the two fission fragments is of the order of twenty times that carried by the chips in the earlier experiments.

The Possibility of a Chain Reaction

Much interest was aroused by uranium fission, and further discoveries were made in quick succession. The uranium isotope that had undergone fission by slow neutrons was shown to be uranium of mass number 235, the one of only 0.7 per cent presence in ordinary uranium. The fission fragments were shown to be not only barium, the one first identified by Hahn and Strassmann in Berlin, but also many others of medium atomic weight. These were found to emit beta and gamma rays. Finally, and this is very important, the process of fission was accompanied by the freeing of neutrons, in number between one and three. Here the

key to the idea of a chain reaction was presented. It is evident that unless the neutrons disappearing by capture to produce fission are replenished automatically a chain reaction cannot occur.

The Chain-Reaction Problem

Let us examine how the number of neutrons may build up. One neutron is captured by an uranium nucleus of mass 235 and it splits into two fairly heavy pieces, and let us say three neutrons are set free. If each of these neutrons is in turn captured by uranium 235 causing fission we have 3 x 3 or 9 neutrons produced in the second generation, 3 x 9 or 27 neutrons produced in the next, 3 x 27 or 81 neutrons produced in the next generation, etc. In other words, the number of neutrons in the system builds up in a divergent chain, with the accompanying release of the energy carried by the split nuclei or fission fragments. At the beginning of such a divergent chain the number of nuclei involved is small and the heat produced is negligible, but if the chain is allowed to run away the number of atoms undergoing fission becomes enormous and the release of nuclear energy in the form of heat constitutes an explosion. In our calculation to illustrate multiplication in a chain we have said nothing about the disappearance of neutrons in ways other than capture in uranium 235 to produce fission. These other ways are of the greatest practical importnace.

The question of whether a chain reaction does or does not go depends on the result of a competition among four processes:

(1) the escape of neutrons through the surface of the uranium system;
(2) the non-fission capture of neutrons by uranium, for example by uranium 238 which leads to plutonium;
(3) The non-fission capture of neutrons by other materials that may be present, such as graphite or heavy water or structural materials;
(4) the capture of neutrons in uranium 235 producing fission and freeing three neutrons per fission.

The first three processes are losses, the fourth a net gain. Their relative values can be altered considerably, as we shall see later.

If it is possible to adjust the competitive processes so that a chain reaction will occur at all, there will be a critical size of the uranium-containing medium. The fraction of neutrons escaping

from the system obviously decreases as the size of the system is made larger. The critical size of a system is defined as the size for which the production of free neutrons by fission is just equal to the loss by escape and capture. If a system of critical size is chain-reacting and then made larger, the chance of escape of neutrons is reduced, the number of neutrons in the system begins to increase, and the power begins to run away. On the other hand, if a system of critical size is working and then made smaller, the chance of escape is increased, the number of neutrons and the power fall towards zero. It is clear that a power plant must be operated at critical size, while a bomb must be made bigger than critical size at the moment that its explosion is desired.

The Use of a Moderator to Improve the Chances of a Chain Reaction

We shall now consider in more detail how to make the chain reaction more likely by reducing the chance of the non-fission capture of neutrons by uranium 238 and impurities and by increasing the chance of fission capture by uranium 235.

One obvious way to reduce the non-fission capture is to separate the uranium isotopes 235 and 238 on a large scale and to throw away the 238. Although this very difficult and costly method was ultimately carried out successfully in the United States to produce the fissile material—uranium 235—in concentrated form for bombs, we shall concentrate our attention on the alternative method. This method aimed to produce plutonium in large chain-reacting piles. Since plutonium is chemically different from uranium, from which it is produced, the problem of separating the two is not very difficult. Now plutonium is similar to uranium 235 in that it undergoes fission under neutron bombardment. This being the case, plutonium can be used to make bombs.

Up to this point, nothing has been said about how the chances of the various kinds of capture of neutrons by the uranium isotopes depend on the speed of the neutron. The speed at which non-fission capture is most probable is intermediate between the average speed of neutrons emitted in the fission process and the speed at which fission capture is most probable. It occurred to a number of physicists that the chances of a chain reaction could be improved if the fast neutrons emitted at the moment of fission were slowed down below the speeds at which non-fission capture in uranium

was highly probable before they encountered unranium nuclei. This result could be achieved to a high degree if a slowing-down or moderator were introduced, and if the natural unranium were not intimately mixed with the moderator but distributed in the form of lumps.

In general, light elements are most effective as slowing-down agents or moderators. In fact, for some years before the discovery of fission, the customary way of slowing down neutrons was to pass them through material of low atomic weight, such as the hydrogeneous material, water.

In considering a possible moderator, regard must be had not only to its slowing-down property but also to its capture of neutrons. The latter should be as low as possible. Ordinary water seemed to be unfavourable on this score according to the work of Joliot, Halban, and Kowarski in 1939. Of the remaining possibilities, carbon and heavy water looked interesting.

Work Leading Up to the First Chain-Reacting Pile

In June 1940, nearly all work on the chain reaction in the United States was concentrated at Columbia University, New York, under Pegram, Fermi and Szilard. Their early studies included the slowing down and capture of neutrons in graphite and the capture of neutrons in uranium 238. In July 1941, the first lattice structure of graphite and uranium oxide was set up at Columbia. It was a graphite cube 8 ft. on an edge and contained about 7 tons of uranium oxide. From measurements of the neutron densities within this cube and later in larger ones it looked more and more likely that, given pure graphite and pure uranium, a chain reaction would occur in a much larger but finite volume if the ingredients were suitably arranged.

About the same time, similar experiments were going on in National Research Laboratory, Ottawa. These were started in 1940 by Dr. G. C. Laurence, and the author joined in the work in the summers of 1941 and 1942 when on holidays from Queen's University. These experiments were undertaken with meagre resources—uranium oxide borrowed from the Eldorado Mining and Refining Company and ten tons of petroleum coke. The latter was a dreadful black powder but the purest form of carbon that could be obtained cheaply. Measurements were well under way on the slowing down and capture of neutrons in the petroleum

coke by the late summer of 1941, and these were followed by measurements on a lattice of uranium oxide lumps buried in the coke. We were unable to conclude definitely whether or not a chain reaction would ultimately be possible, chiefly because the materials were not pure enough and the quantities available were too small.

With increasing resources and personnel, the American physicists pushed towards their goal. The first chain-reacting pile in the world was operated for the first time on December 2nd, 1942. It was built under the West Stands of the football stadium of the University of Chicago. Initially the pile was operated at a power level of half a watt, but on December 12th the level was raised to 200 watts. Briefly, the rest of this story was that with the experience gained from pilot plants the Americans built plutonium production piles and made bombs.

Let us retrace our steps a little and pick up the second thread to the story. At the time of the fall of France in 1940, part of the Paris group of physicists escaped to England, taking with them almost the world's supply of heavy water. In Cambridge the British and French pursued their investigations on the possibilities of heavy water as a moderator, which looked very promising.

By 1942 it was felt in Great Britain that the research of the Cambridge group would proceed more quickly and efficiently if it were transferred to this continent, where the industrial facilities were not so heavily burdened by the war, and where it would be close to the natural resources of Canada and the corresponding research work in the United States. Accordingly, the Montreal Laboratory was established under the administration of the National Research Council. It was to provide facilities for nuclear research by a combined group of United Kingdom and Canadian scientists and included some from New Zealand and the Free French.

Later came the agreement that Canada should build a pilot plant to make plutonium in small quantities by the natural uranium and heavy water method. The major effort of the Montreal Laboratory has been directed towards the final design of this plant, located at Chalk River, and the perfection of a chemical method for the extraction of plutonium from uranium There is at Chalk River an extensive group of laboratories for pursuing the ramifications of the subject of nuclear energy.

Procurement of Materials

Engineers would be no doubt most interested in the technical and procurement problems that scientists and industry, particularly in the United States, have solved in a remarkably short time.

It has been pointed out that the materials going into the pile must be very pure, that is, they must be as free as possible from elements that capture neutrons strongly if the critical size of the pile is not to be too great. This demand created entirely new problems.

The graphite problem in 1942 was one of purity and priority. While commercial graphite is a remarkably pure substance, it was not pure enough. No customer had ever before cared if his graphite electrodes contained a little boron or other impurities. Following suggestions made by experts at the Washington Bureau of Standards, two carbon companies were able to produce highly purified graphite with a neutron absorption some 20 per cent less than the standard commercial materials previously used, and large orders were placed for plant construction.

At the end of 1941, only a fraction of a pound of uranium metal was in existence. The raw material was a limited amount of black oxide obtainable from Canadian sources. It contained 2 to 5 per cent of impurities. By May 1942, deliveries averaging 15 tons a month of black oxide of higher purity and more uniform grade started coming in. Total impurities were less than one per cent but this was too much. An ether extraction method was desived at the National Bureau of Standards, Washington, and put into industrial operation by a chemical works. By this process about a ton a day of impure commercial oxide was transformed to oxide of a degree of purity seldom achieved even on a laboratory scale.

The difficulties of making metal from the oxide were also overcome by the end of 1942, and some six tons of the metal were incorporated in the first pile built at Chicago. The first process cost about $1,000 a pound and was slow. The final processes were simple, rapid and cheap.

In 1940, the world's supply of heavy water was less than 500 pounds, and had come from the Norwegian plant, which fell under German control. Two methods of concentrating heavy water were known—fractional distillation and the hydrogen-water exchange reaction. Each requires a large installation and the expenditure of much heat or electrical energy for large scale

production. Such plants have been put into operation by the du Pont Company in the United States and by the Consolidated Mining and Smelting Company at Trail, B.C.

Problems of Pile Design

We have noted that a lattice arrangement of uranium metal in a moderator of graphite or heavy water is most economical of materials. If the uranium were in lumps it would be difficult to remove them in order to send them to the plutonium extraction plant. Secondly, it would be difficult to concentrate the coolant at the lumps, which are the hot spots. Both these difficulties are avoided if a rod lattice rather than a lump lattice is used.

The critical size of the chain-reacting system must be known in advance of construction. Physicists determine this by making measurements on a system that is usually much smaller than critical size. This type of investigation has been dealt with in reviewing the American work on the uranium and graphite lattice, which lead to the first chain-reacting pile. Similar work on uranium and heavy water has been part of the research programme of the Nuclear Physics Division in Montreal. It is possible to reduce the critical size by the use of a reflector of neutrons such as a graphite wall built around the uranium containing unit, the wall reducing the loss of neutrons from the latter.

If river water is used as a coolant it has to be conveyed in pipes through the reacting unit. The choice of the pipe material is limited by nuclear physics considerations. In particular its capture of neutrons must be small. Further, the material must not fall apart under intense neutron and gamma radiation, and it must not leak, corrode nor warp. Of the few possible metals, aluminum was chosen for the American production plants.

In order to prevent corrosion of the uranium by the water and to prevent dangerously large amounts of fission products from being carried along in the stream, the uranium rods must be jacketed in a suitable metal. These jackets must be tight and remain tight during operation. Here again the choice of metal is limited by nuclear physics as well as engineering considerations.

If the power of the plant is high the water requirements are considerable. A pumping station and a filtration and water treatment plant may be necessary. The water system has to be most reliable, and it is wise to provide fast operating controls to

shut down the chain-reacting unit in a hurry in case of failure of the water supply. If the once-through cooling instead of recirculation is adopted, a retention basin is provided so that radioactivity induced in the water will die before it is returned to the river.

Since the neutrons that maintain the chain reaction and the gamma rays from the accumulated fission products are damaging to biological tissue, thick concrete shields around the unit are necessary to protect personnel.

The choice of electric insulating materials for instruments buried in the pile for power measurement must be carefully considered, for they must not lose their insulating property under irradiation.

The control of the power is relatively easy. Strips of cadmium or boron steel, which capture neutrons strongly, may be inserted in the pile and used for fine control by moving them in or out slowly or for emergency shutdown by moving them in quickly.

When the plutonium has accumulated sufficiently in a rod it must be withdrawn and taken to the chemical plant. The fission products in the rod emit beta and gamma rays, and therefore one cannot approach it unshielded. Chemical operations have to be done behind heavy concrete shields, and be directed by remote control. The extraction method must separate plutonium from uranium and the dangerously active fission products comprising some thirty elements that have mass numbers approximately in the ranges 127 to 154 and 83 to 115. The amount of plutonium to be extracted from tons of uranium is small. The choice of extraction process was based on the chemical properties of plutonium worked out in the laboratory on less than one milligram.

At an assumed rate of one kilogram of plutonium a day, a 500,000 to 1,500,000 kilowatt plant is required, which may be compared with the capacity—2,000,000 kilowatts—of the hydroelectric plants at the Grand Coulee Dam.

The Immediate Future of Nuclear Energy

What about the immediate future of nuclear energy that can be derived from uranium 235 and plutonium? In thinking of the future, certain limitations must be kept in mind. Chain-reacting piles are large and must be surrounded by very heavy shields. Once a unit has been operated at appreciable power it is impossible

to go inside the shield, even when the plant is shut down, to make adjustments or effect repairs, owing to the hazard of the gamma radiation.

It seems, therefore, that nuclear power units of the pile type will be used only in very special cases. A large stationary power installation might be used for heat and motive power in the Arctic or Antarctic regions far removed from water power and where the difficulty of transporting other fuels such as coal or oil outweigh the disadvantages and difficulties of operating and maintaining a nuclear power plant. One can hardly envisage in the near future the use of nuclear power for propulsion except perhaps in battleships or large rockets. It should be remembered too that the basic fuels for nuclear power—uranium 235 and plutonium—are in short supply.

The most interesting uses of nuclear energy and the most beneficial for humanity lie in other fields. The practical uses of radium were always severely restricted by its cost—a million dollars an ounce. Vast amounts of radioactive materials—the fission fragments—accumulate in the uranium in a plant such as that at Chalk River. Moreover, almost any material inserted inside the concrete shield will become intensely radioactive. We have now the prospect of new and far-reaching applications of these cheap radioactive materials in industry, biology, and medicine.

In industry these materials may be used to supplement radium and X-rays for the radiographic inspection of castings, welds, forging, etc.

In biochemistry and pharmacology these materials will permit the fullest applications of the tracer method in studying the movement of specific atoms through an organism. For example, some of the atoms of a drug are made radioactive in the pile before being used, and thereafter they can be located in the body by their radioactivity.

In the treatment of cancer these new radioactive materials will greatly supplement radium and X-rays, and make possible cheap but effective treatment at many clinics. These developments will take a little time, for the doctors and physicists working together must first adapt radiological techniques to the properties of the new materials and then acquaint the practising physicians with the techniques. A graduate school in Medical Radiology in one of our universities is now greatly needed to give young radiologists

the full and comprehensive training required in this greatly extended field of service.

The Future of the Chalk River Establishment

Everyone of us has a small stake in the Chalk River establishment, for it was with our money that the Federal Government built it. For the first time in our history we have in Canada a research establishment that is second to none anywhere. Canada has got off to a good start in the field of atomic energy. Having made the investment you have the right to ask that the research facilities provided on such a magnificent scale be used to the utmost to keep us in the forefront of new developments. Of course financial support will be necessary year by year to operate the plant, to keep the laboratory equipment up to date, and to maintain the research staff in effective strength. The days have gone when it was possible for a lone physicist to make discoveries with a tin box, a piece of wire and a stick of sealing wax. In deciding on an adequate strength of staff we must beware of being unduly influenced by our pre-war conception of numbers, for there were then no facilities of the same magnitude. Moreover, the salaries for research staff do not predominate over other separate costs, and even the annual total does not approach the capital cost.

Granted financial support, the next question is whether an adequate staff of Canadian scientists can be maintained and expanded to take care of the vacancies created when some of our colleagues from the United Kingdom return home. Trained scientific workers with imagination will be needed. Since Canada's population is not large, in the best of times we have not a large body of trained research workers to draw on. Moreover, we may have to contend with the implication in the remark that someone made before the war: "Canada's highest quality exports to the United States are whisky and brains". The expanding economy and the havoc war wrought in the flow of research workers from the universities means that a scarcity of such workers prevails almost everywhere in the world to-day. In spite of these difficulties, it should be evident that, given satisfactory living and working conditions and freedom of expression which make for happiness, the right scientists will be attracted to the establishment.

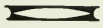
From what I have seen already, I have good reason for feeling optimistic.

There is another point that should be mentioned. Scientists at Chalk River are in fairly general agreement that the atmoshpere of the establishment should tend towards that in a thriving university laboratory. Lecture courses and seminars should be held, not for credits towards degrees, but to train newcomers and generally to keep the staff informed on new developments. It is desirable also that research students in the universities should have the opportunity to use some of the facilities. Of course it may not be possible to provide space and research apparatus for all who may wish to seize such an opportunity. The training of research workers in the laboratories of the universities and the National Research Council is obviously of the utmost importance for the future. Any widening of opportunity of the type suggested here may only be possible if the secrecy regulations are moderated.

Wars have interrupted the otherwise continuous thread of friendliness and cooperation among the scientists of the world, who seem to have practised internationalism better than any other group. Instances of this spirit have been many.

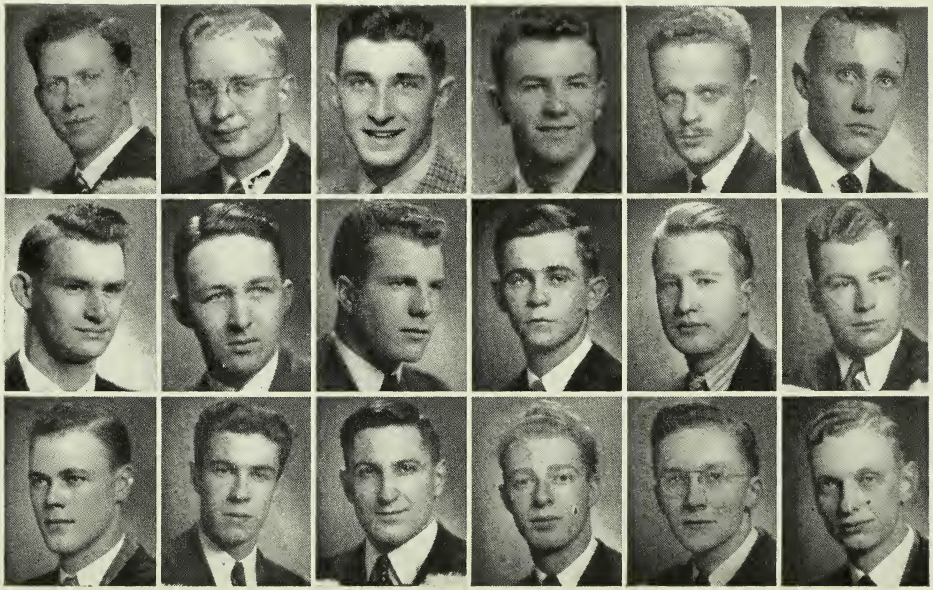
In 1908 the Vienna Academy of Sciences helped Rutherford in his work by the loan of 300 milligrams of radium free of cost. After the First World War it seemed as though the radium would be confiscated by the British as enemy property. Rutherford intervened and had it released. Some years later when the financial difficulties of the Vienna institutes were at their climax, he bought the radium and so enabled research in Vienna to be carried on. A more generally known instance of the cooperation of scientists was the generous treatment that the refugee scientists from the Fascist countries received in Great Britain and the United States. It will be a great pity, indeed a hindrance to progress, if this spirit of friendliness and cooperation does not return.

YEAR BOOK
1946



EXECUTIVES, CLUBS,
SOCIAL FUNCTIONS

ENGINEERING SOCIETY
THE UNIVERSITY OF TORONTO



ENGINEERING SOCIETY EXECUTIVE

Top Row: M. McCulloch, F. Belshaw, R. Tredgett, C. W. Daniel, P. Kingsmill, A. T. Klassen.

Middle Row: J. Allingham, F. Crawford, E. W. Dafoe, M. R. Davidson, F. A. Godfrey, G. S. MacIver.

Bottom Row: H. R. McKnight, R. G. Paterson, A. J. Pudsey, R. Singer, G. Slemon, P. F. Tillman.

ENGINEERING SOCIETY EXECUTIVE
1946-47

President ..... C. W. Daniel
1st Vice-President ..... J. A. Brown (Accl.)
2nd Vice-President ..... J. D. Service
Secretary ..... J. R. A. Walker
Treasurer ..... B. A. Warren

ATHLETIC ASSOCIATION EXECUTIVE

Vice-President ..... W. J. McCann
Secretary-Treasurer ..... J. Swan (Accl.)

EXECUTIVE 4T7

President ..... R. J. Smith
Vice-President ..... H. J. Hamm (Accl.)
Secretary-Treasurer ..... D. G. Henshaw (Accl.)
Athletic Representative ..... T. L. Hennessy

EXECUTIVE 4T8

President ..... W. MacDonald
Vice-President ..... R. Grass
Secretary-Treasurer ..... W. O. C. Miller
Athletic Representative ..... M. D. Guppy

EXECUTIVE 4T9

President ..... J. C. Cameron
Vice-President ..... W. C. Winegard
Secretary-Treasurer ..... T. A. Harwood
Athletic Representative ..... W. Lawrence (Accl.)

CLUB CHAIRMEN

Civil ..... R. A. Weir
Mining and Metallurgical ..... C. W. Eggert
Mechanical ..... W. G. Gansler (Acc.)
Architectural ..... N. McMurick (Accl.)
Engineering Physics ..... W. R. J. Brown (Accl.)
Chemical ..... M. E. J. O'Loughlin (Accl.)
Electrical ..... D. J. T. Glenn
Debates ..... C. A. Fry (Accl.)
Aeronautical ..... E. L. Davies (Accl.)
Engineering and Business ..... F. J. Langan (Accl.)

PERMANENT EXECUTIVE

President ..... R. Davidson
Vice-President (1) ..... M. D. McCulloch
(2) ..... A. N. Campbell
Secretary-Treasurer ..... A. M. Lount
Councillors

Dept. 1—G. E. Evans (Accl.)
Dept. 2—E. W. Dafoe (Accl.)
Dept. 3—D. A. Price
Dept. 4—P. F. Tillman (Accl.)
Dept. 5—J. F. Allingham (Accl.)
Dept. 6—S. A. Cooke (Accl.)
Dept. 7—G. S. Slemon (Accl.)
Dept. 8—G. M. Johnston (Accl.)
Dept. 10—C. E. Burrell (Accl.)

Bronze "S" ..... J. D. B. Bromley

CIVIL CLUB EXECUTIVE

[illegible] J. F. WALKER

[illegible] R. A. WEIR, [illegible]

CIVIL CLUB

THE PAST YEAR HAS SEEN GREAT EVENTS COME ABOUT—THE END of the war in Europe, the end of the war in the Pacific and the discovery of the atomic bomb. At Toronto, returning servicemen registered in large numbers in first year at "School" and at Ajax, a phenomenal number began attending lectures and labs.

The first club activity took place on November 16th and 17th in the form of a fourth year overnight field trip to DeCew Falls and the Bethlehem Steel plant at Lackawanna, N.Y. After inspecting the power development plant at DeCew, the party proceeded by bus to see the Welland Canal locks and thence to Buffalo where they spent the night. The next day a complete trip through the steel mills proved very interesting. Professors Huggins, Morrison and Legget were also present.

A dinner meeting on January 16th, was held at Hart House and afterwards in the Debates room a film, dealing with the construction of the famous San Francisco "Golden Gate" Bridge, was shown. A short interesting film, taken by a fourth year member on the DeCew trip, was also shown.

Open House arrangements, as carried out with the help of various members of the department, were very successful.

Due to the necessity of early publication other scheduled meetings still to take place will have to remain unmentioned.

To the incoming executive, I should like to offer my most sincere wishes for a very successful year and to all members of the Club—the best of luck and all the success in the world.

R. G. PATERSON,
Chairman.

MINING AND METAL CLUB

Back Row: J. E. Davidson, R. M. Brown, P. Tymchko, F. Gerson.
Front Row: L. Cooper, G. M. Johnston, E. W. Dafoe, E. O. B. Hallet, C. W. Eggert.
Absent: Dr. L. M. Pidgeon, N. G. Eley, W. C. Winegard.

MINING AND METALLURGICAL CLUB

DURING THE PAST ACADEMIC YEAR, THE EXECUTIVE OF THE CLUB has endeavoured to bring the students of all the years and the staff together by means of dinner meetings. Generally, the speakers were well known men who were experts in their respective fields.

The first meeting of the year took place in the West End Veteran's Club, where our annual stag was held. The meeting was well attended, and judged by all to be very successful.

The next meeting was held on December 4th at the Chez Paree Restaurant. Dr. A. A. Brant was the guest speaker and gave a very interesting talk on the application of geophysics to preliminary exploration and development work.

This was followed by a dinner in the Great Hall of Hart House, after which the members adjourned to the Debates Room where Col. Pearson of the *Northern Miner*, gave a very interesting account of his impression of post-war Germany.

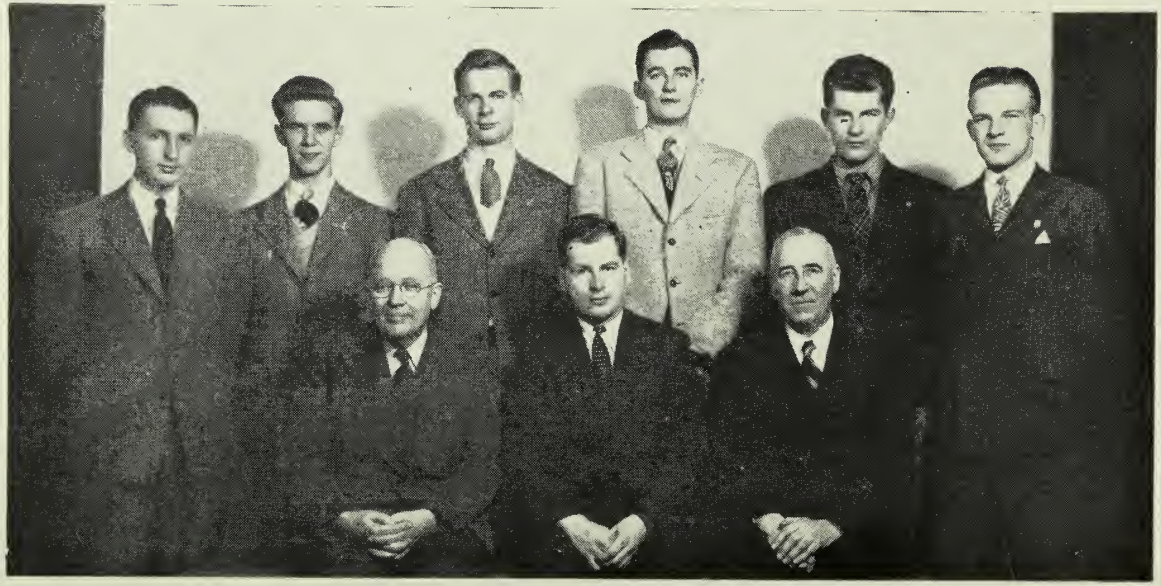
On February 27, 1946, the members of the Club were the guests of the Toronto Branch of the C.I.M.M. at a dinner meeting at the King Edward Hotel. A very interesting movie on the mining and smelting of nickel-copper ores at the International Nickel Co. was shown. This meeting was greatly enjoyed by every member and a hearty vote of thanks to the hosts was definitely in order.

At the present time, plans are going ahead for our annual dinner to be held at Diana Sweets on March 7/46.

During the year, several field trips were held. The first of these was a trip to the Steel Company of Canada at Hamilton by third and fourth year Metallurgists. This was followed by a trip to the Aluminum Company of Canada at Etobicoke on November 9th, and an excursion to General Electric Carbaloy's plant, both by the fourth year Metallurgists. On Monday, November 23rd, the 4th year Miners and Metallurgists journeyed to Orillia, and visited the plants of E. Long and Company and Fahralloy Limited. A visit to the Acme Screw and Gear Company by the fourth year Metallurgists concluded the year's excursions.

I would like to take this opportunity of thanking the Club Executive for their fine co-operation and support, and of wishing next year's executive every success, in their activities.

E. W. DAFOE,
Chairman.



MECHANICAL CLUB

MECHANICAL CLUB

THE ACTIVITIES OF THE MECHANICAL CLUB COMMENCED FOR THE 1945-46 season with the first meeting of the year held at Hart House November 13th. A good dinner was enjoyed by all in the Great Hall. Afterwards, in the Debates Room, the Executive for 1945-46 was introduced to the members. Mr. C. N. Danks, of the Canadian Ingersoll Rand Company, honorary chairman, gave a short talk and then showed coloured movies on mining operations and machinery of interest to mechanical engineers. Pamphlets were handed out at the end of the meeting to all members.

The next meeting, December 10th, also held in Hart House, was a combined meeting of both the American Society of Mechanical Engineers (A.S.M.E. Student Branch) and the Mechanical Club. Mr. W. F. Taylor of Duplatt Plastics Limited, Oshawa, Ontario, gave an interesting talk to a large audience.

The third meeting of the season was held January 22nd, in Hart House, Debates Room. Mr. C. N. Danks gave an illustrated talk on air compressors and answered many questions asked by the Mechanical Engineers of tomorrow.

The final meeting and Annual Dinner was held at the Chey Paree on February 19th. Dinner and the customary toasts were followed by short talks from both Mr. C. N. Danks and Professor E. A. Allcut. The Chairman then introduced the guest speaker Mr. I. M Bodine, Executive Engineer of Canadian Ice Machine Company. He gave an excellent talk on "You." It was very interesting and instructive not only to the graduating members but also to those who have yet to reach fourth year. Booklets were distributed to all members through the courtesy of S.K.F. Company. A very enjoyable and profitable evening was spent by all and the meeting was brought to a close by a lusty Toike Oike.

I would like to take this opportunity to thank Mr. Danks and Professor Allcut for their excellent support and to wish the new executive the best success.

G. MACIVOR,
Chairman.

ARCHITECTURAL CLUB

Back Row: L. G. Baker, F. Fletcher, Miss P. Hughes, Mrs. C. R. Rounthwaite, O. Rogers.
Front Row: N. H. McMurrick, P. F. Tillman, Miss J. Robinson.

ARCHITECTURAL CLUB

THE CLUB ACTIVITIES THIS YEAR WERE FEW AND FAR BETWEEN since everyone was well occupied with his work. First year set a real pace in drafting for the rest of the department, undoubtedly preparing themselves for the competition of our hundred new Ajax members.

Fifth year extended their annual field trip by a few miles this year. We went to the New England States to make a study of modern Architecture. Included in our travels was a five day stop-over in Boston where we visited Massachusetts Institute of Technology and Harvard. Only upon the depletion of our funds were we encouraged to return to our work.

The other years also went on some interesting field trips. Second year are now able to give particulars on how long it takes the fireman to answer any alarm. Third year will provide the details of a day at a crematorium.

As always, the Architects busily carried out the decorations for many of the school functions. We are still grateful to the Schoolmen who carried home the decorations after the School At-Home—this solved the problem of who was going to remove the decorations from the hotel on the morning after.

The Club party was held this year at the Willowdale Riding Club. We enjoyed the sleigh-ride and dance very much but were disappointed that more students were unable to get in from Ajax.

The final light of the year was a visit to Ajax. Everyone was impressed with the enthusiasm and eagerness of the new first year. We who are graduating know that we are leaving the club in excellent hands and wish to those who follow, the best of luck and smooth sailing!

P. TILLMAN, *Chairman.*

ENGINEERING PHYSICS CLUB

Back Row: D. Beattie, R. R. Galpin, W. J. MacNeil, W. R. J. Brown.
Front Row: J. D. Baker, J. F. Allingham, Prof. C. Barnes.
Absent: F. Huntley.

ENGINEERING PHYSICS CLUB

DURING THE PAST YEAR A DETERMINED EFFORT HAS BEEN MADE to keep the activities of the Engineering Physics Club up to the excellent standards of the past.

This year the Club's activities started with a dinner meeting held on October 30th, in Hart House at which Dr. Saunders, from the National Research Council, gave a very interesting account of "The Developments of Radar". At this meeting the freshmen were heartily welcomed into the Club, although, due to the absence of initiations, some of the glamour and vigor of former years was lacking.

The meeting for December was postponed until after the new year and on January 29th, Prof. K. B. Jackson illustrated his talk on "Stereoscopic Photography" with projections in colour and in black and white. At the end of the meeting a very instructive and informal discussion of the possible improvements of the Engineering Physics Course took place.

The next meeting was the annual Club dance which was held in February at the now familiar Ramona Gardens.

To bring to an end the Club activities for the year a banquet is planned for March 13th at the Diet Kitchen.

In closing, your chairman extends his hearty thanks to the members and the executive for their co-operation and support, and wishes every success for the Club in the coming years.

J. F. ALLINGHAM,
Chairman.

INDUSTRIAL CHEMICAL CLUB

Back Row: J. Stubbs, M. E. O'Loughlin, G. C. Huddleston, W. E. A. Rispin, J. G. Walker.
Front Row: R. L. Jonas, H. R. McKnight, R. L. McLaughlin.
Absent: J. M. Langton.

INDUSTRIAL CHEMICAL CLUB

THE ACTIVITIES OF THE CLUB STARTED ON OCTOBER 25TH, 1945, when we had a smoker at the West End Veteran's Club. This was followed by a dinner meeting in the latter part of November at Hart House where Mr. Martin, from the Dominion Tar and Chemical Company, gave us an interesting talk on the phthalic anhydrede process; also in attendance was Dr. Croal, High School Inspector of Toronto, who spoke to us on the Atomic Theory.

On January 22nd, 1946, we had a class room meeting where B. H. Lloyd from the Ontario Research Foundation gave us an illustrated talk on the current subject, Quality Control. The final dinner meeting was held on February 26th, 1946 at Chez Paree Restaurant where we had a sing-song and saw an interesting sound film on the development of synthetic rubber called "Victory Through Rubber." To supplement the film we were fortunate in being able to secure Mr. R. Hatsch from the Polymer Corporation in Sarnia.

The year's activities were wound up by another class room lecture by our Honorary Chairman, Mr. J. M. Langton who gave us an illustrated talk on the process at the Imperial Varnish and Color Company.

The fourth year had a very interesting field trip in October to the Ontario Paper Company at Thorold. On November 26th, the fourth year went to Sarnia to visit the Imperial Oil and the Polymer Corporation plants. One more trip is planned for the class of 4T6 at time of writing, to go through the Fibre Glass plant in Oshawa. The third year had several trips to various plants throughout the city—O'Keefe's Brewery, B. A. Oil Refinery at Clarkson and Lever Brothers.

The club was very successful during the current year and many thanks are extended to the executive and members of the club for their enthusiasm and co-operation.

H. R. MCKNIGHT, *Chairman.*

ELECTRICAL CLUB EXECUTIVE

Back Row: R. T. Crawford, E. R. Howchin, G. A. Mackie, W. H. Seeley.

ELECTRICAL CLUB

"ENGINEERS MUST BE CONSCIOUS OF THEIR POSITION IN SOCIETY" emphasized Mr. W. J. Gibson, Honorary Chairman of the Club at the reception dinner held early in November in Hart House. At this meeting a record enrolment of freshmen was welcomed into the Club activities. Later in the month the club went social, dancing to Red Heron's music at the Balmy Beach Canoe Club.

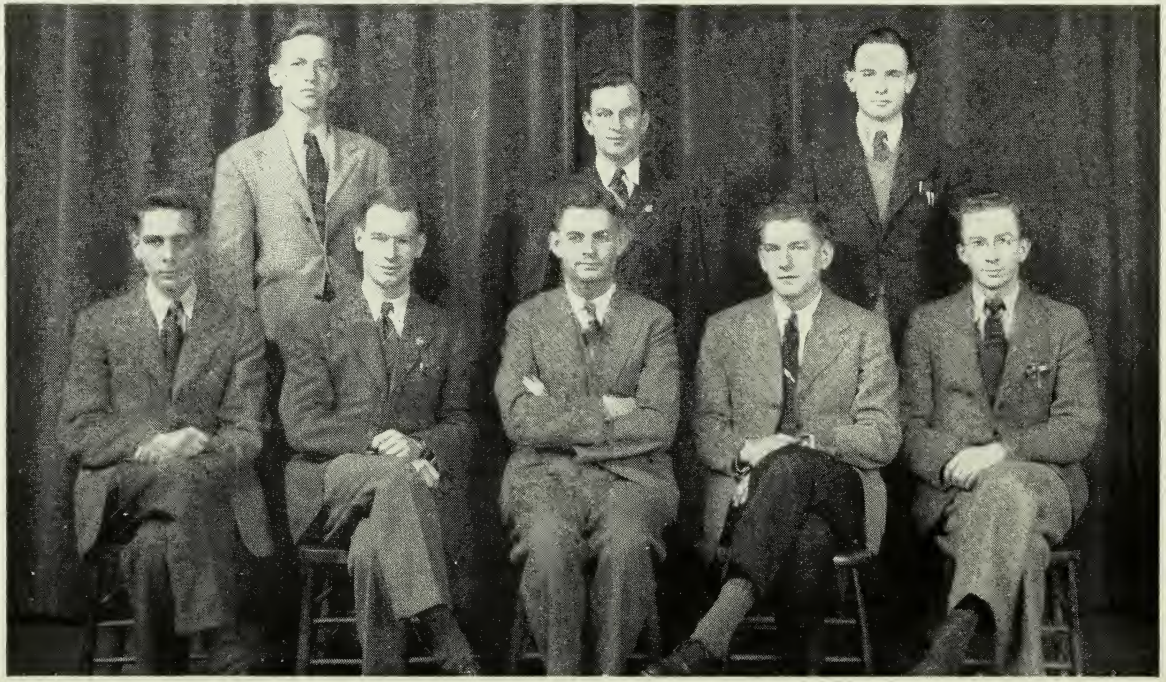
December's activities followed a more technical trend. Field trips were taken by all years to Niagara Falls and Hamilton as well as to local plants.

"Young engineers given freedom to create will be a secure long-term investment for their employers" stated Mr. G. F. C. Weedon in his prize winning speech to the Joint Meeting of the Club with the American Institute of Electrical Engineers. Other 4th year speakers were Mr. N. R. Buchanan, Mr. E. E. Major and Mr. G. R. Slemon.

Research was the subject discussed at the February Dinner and Smoker. The speaker, Prof. J. O. Wilhelm of the Physics Department stressed an aggressive Canadian research policy.

The Annual Banquet will be addressed this year by Mr. L. S. Sinclair, Radio Actor and Writer. This will conclude the activities of an interesting and successful year.

GORDON R. SLEMON,
Chairman.



AMERICAN SOCIETY OF MECHANICAL ENGINEERS
(Student Branch)

Back Row: D. R. YEOMANS, III Rep.; H. DEDERER, II Rep.; A. E. DALRYMPLE, IV Rep.

Front Row: J. E. MCEWEN, Papers and Meetings Section; R. W. STEDMAN, Vice Chairman; PROF. I. W. SMITH, Honorary Chairman; E. J. DURAND, Chairman; H. L. BROWN, Secretary.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS STUDENT BRANCH

THE OBJECT OF THE STUDENT BRANCH A.S.M.E. IS PRIMARILY TO establish connections with a national organization of Mechanical Engineers, and to broaden the outlook of its members by various club activities.

The benefits of membership are many. For a nominal fee, members receive monthly issues of "Mechanical Engineering", a membership card and pin, and various technical publications obtained by the Branch. An engineering library and Personnel Service are available for consultation in New York. Members may compete for various cash prizes, and may attend a Student Branch Convention in the spring, or a special Student Meeting at the Annual A.S.M.E. Convention. Also, Student Members save a $10.00 initiation fee when they become Junior A.S.M.E. Members. Meetings are conducted during the year, at which prominent engineers speak on various topics of interest.

The first meeting this year was a joint one with the Junior A.S.M.E. A panel of representatives from various professional organizations discussed salaries and opportunities in engineering, and answered questions troubling the young engineers of today. Copies of the Engineers' Salary Survey, conducted by the Junior E.I.C., were distributed free to all present.

The second meeting was in the form of a joint dinner with the Mechanical Club, followed by an interesting talk on "Plastics" by Mr. W. F. Taylor of Duplate Canada Limited. Samples were displayed and a brisk question period concluded the meeting.

Mr. G. E. Otter, Chief Engineer of Fleet Aircraft, Limited, was present as guest speaker at the third meeting. He gave a very interesting talk on "The Future Development of Private Aircraft in Canada."

The final meeting of the year will be a speaking competition among Student A.S.M.E. Members for cash prizes.

EDWIN DURAND,
Chairman.

AERONAUTICAL CLUB EXECUTIVE

Standing: G. V. Bull, T. G. Higgins, D. Stubley, K. Livingstone, W. Johnson.
Seated: W. G. Carter, Prof. T. R. Loudon, A. J. Pudsey, E. L. Davies.

AERONAUTICAL CLUB

ON OCTOBER 18TH, 1945 THE AERONAUTICAL CLUB MEMBERS welcomed their new members to the University by holding a freshman reception and banquet in the Hart House. After dinner the guest speaker, Dr. Rogers (F/Lt. R.C.A.F.), talked about "Medicine and its Relation to Aircraft Design." Then he showed the members coloured sound movies which illustrated the effect of gravity on a pilot. He also brought some sample anti-gravity suits and oxygen equipment for the Club members to examine. The excellent attendance at this first meeting encouraged the Club executive and a field trip to the Bell Aircraft Corporation at Niagara Falls New York was organized.

On coming to the plant, each club member was presented with a small celluloid airplane on which the member's name was written. This served as an identification card. Ten members of the Bell engineering staff showed the club members around the plant engineering office until lunch time. Then one half of the Club members were treated to a wonderful lunch in the executive dining room, while the other half of the members enjoyed coloured sound movies on the birth of jet-propulsion and helicopters. Later, the second group had lunch while the first group enjoyed the movies. After lunch an inspection trip of the production lines was made. The club members saw jet-planes, helicopters and were treated to an open air show when the chief test pilot took off in a jet plane and shot up the airfield. He then took off in a helicopter and flew backwards, vertically and then remained stationary. It was with much regret that we returned home late that evening.

During December, first year were writing examinations so executive meetings only were held and a stag party and sleigh-ride were planned for the new year. Unfortunately no rooms were available and there was little snow so these plans were abandoned.

The final meeting was held Thursday, March 14th, 1945. Mr. W. F. Campbell, head of the Aerodynamics Laboratories of the National Research Council, gave a short informative talk on "High Speed Research." He was a member of the recent party touring European laboratories and gathered much useful information on supersonic wind tunnels. The talk was preceded by a chicken dinner at Cole's which served as a farewell banquet for the graduating class.

AMOS J. PUDSEY,
Chairman.

CERAMICS CLUB EXECUTIVE

Back Row: J. E. Runnalls, H. J. Ballantyne, J. M. McRobert, W. G. Coulter S. A. Polocny, A. F. Trott, W. H. Jones.

Front Row: M. R. Stamps, T. A. Greening, Prof. R. J. Montgomery, R. A. Tothe, W. S. Redman.

Absent: R. Shonk, T. E. Howarth, K. McFee, Miss F. Bradfield, N. McFadden, F. Cullen, J. S. Muchmor.

ORGANIZATION OF CERAMIC CLUB

THE SCHOOL TERM 1945-46 SAW THE FORMATION OF THE CERAMIC Club which was associated with the Canadian Ceramic Society in an endeavour to combine more closely the activities of the students in Ceramics with those of the Ceramic industry.

The club was first formed in November and was subsequently accepted by the Canadian Ceramic Society as a student branch of this organization. At a meeting of the executive it was decided that field trips through several plants allied with the Ceramic industry should be arranged. It was also arranged to have meetings with guest speakers to acquaint the students with the progress being made in the technical departments of the various clay industries as well as to give the students in the different years a chance to become better acquainted.

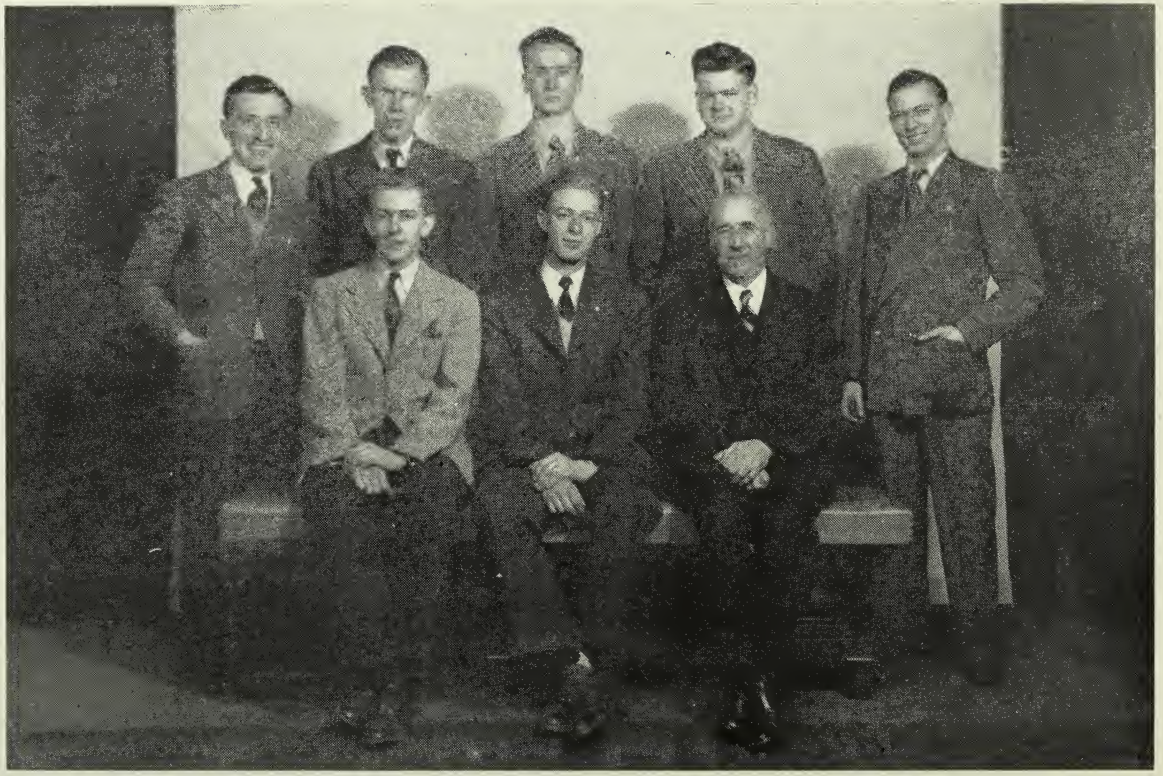
In late November the club visited the Fiberglass Company in Oshawa where they were shown the various stages in the processing of shatterproof glass, armourplate, fiberglass and plastics. In December the club staged a field trip to Hamilton where they spent the morning touring the Canadian Porcelain Company and inspecting the different types of electrical insulators. In the afternoon a conducted trip was held through Sovereign Potters.

On February 4 and 5 the student branch of the Canadian Ceramic Society was well represented at the Society's annual convention in Hamilton.

The final meeting of the year was held in late February in the Mining Building where Professor L. J. Rogers gave an interesting talk on the difficulties encountered in first getting the production of optical glass under way at Research Enterprises Limited.

The record enrolment in Ceramics at the U. of T. and the unanimous desire of the students to have a Ceramics club made possible the formation of the club this year. Activities of the club were somewhat restricted as it was only recently formed and most of the calendar year was required to organize the group. However, an excellent start has been obtained and this speaks well for the future of the club.

In concluding I would like to take this opportunity to express the appreciation of the members of the club to Prof. R. J. Montgomery whose untiring efforts on behalf of the club did much to establish the U. of T. student branch of the Canadian Ceramic Society.



DEBATES CLUB EXECUTIVE

Standing: B. P. Stoicheff, A. M. Lount, W. A. Dimma, A. H. Milling, J. Stanborough.
Sitting: C. A. Fry, R. A. Singer, Prof. E. A. Allcut.

DEBATES CLUB

THE FUNCTION OF THE DEBATES CLUB IS TO GIVE UNDERGRADUATE Engineers an opportunity to develop their power of speech and to express their ideas in public.

At the first meeting in the fall, Murray Lount and Al. Rosenberg, successfully upheld the resolution, "The secret of atomic energy should be made available to all mankind." The negative side was taken by Harold Wardell and Garth Weedon.

The desirability of a Canadian national flag was next debated. John Mills and Art Jackes, who were in favour of a new flag, carried the motion with the wide support of the House.

Of Campus-wide interest was the subject, "Resolved that the union shop is undemocratic" which was overwhelmingly defeated. Jack Stanborough and Jack Roxborough were the winning side, opposing Bill Adams and Harold Koehler. A lively and interesting discussion took place after the debate.

The best attended debate of the year was, "Resolved that beverage rooms should be replaced by open bars." Eric Dafoe and Bob Sims, with spirited and impassioned speeches, carried the resolution. Always remembered will be the plea of the opposition, Boris Stoicheff and Ted Gerson that they were not against drinking.

The Year's activities ended with the impromptu Speaking Contests, won by T. Hogg and V. Richards.

The executive feels that the club has enjoyed a very successful year, for which thanks go out to the Honorary Chairman Professor Allcut for his suggestions and assistance.

Another School year has come and gone, leaving behind it fond memories of University life. As we pass out of S.P.S. we wish all those who follow the enjoyment of the pleasant experiences that have been ours, and hope the Club has every success in the future.

BOB SINGER, *Chairman.*

TOIKE OIKE STAFF

Front Row (Seated): G. Rosenthall, F. L. Kahn.
Back Row: P. N. Neurath, W. R. Brown, R. E. Cooke.

TOIKE OIKE

THE FIRST PEACE TIME TOIKE OIKE, GARBED IN THE TRADITIONAL green, formally welcomed the second class of ex-servicemen. It offered consolation and advice on the new environment in its own accepted literary manner. It was noticeably charged with significant remarks concerning international security above its usual subject matter in view of the occasion.

Soon after this followed the Reception issue with the terrific tidings of the dance, and also offering notices of activities of the departmental clubs for the term.

Upon the stately and historic occasion of the Engineering Society Diamond Jubilee Dinner, Toike Oike enveloped the menu and programme bringing sidelights on the event, while a striking cover shielded it from the supping Schoolmen's sustenance.

School Nite demanded something new and different and many were shocked to find so refined and elegant a programme. Others were distressed at the noticeable absence of rare philosophy. Still more were astonished to find that they were covered with a deposit of "gold" particles that had strayed from their home on the artistic cover drawing (artist: Gord Alison).

Immediately after the mid-session exams, a purposeful publicity issue for the School-at-Home reached the public to arouse to action the casanovas of the campus.

The new Ajax Division was then received in a martial Coronation Red issue with facts to help the establishment and organization of facilities on the Ajax Campus.

In late February, the annual Magazine Edition appeared in new brighter form offering the literary and scientific writing talents of a score of conscientious students. Circulation was raised to 3,000 in order to ensure complete distribution to all Engineering students.

The perennial Election and Graduation Editions completed Volume XXXVII and joined the other efforts in the filing case to gather dust . . . as we pocketed our prolific pens.

GORD ROSENTHAL,
Editor.

SCHOOL DINNER COMMITTEE

Back Row: F. Fletcher, D. A. White, G. Macivor.
Front Row: H. M. Laski, M. R. Davidson, F. Belshaw, M. D. McCulloch, R. G. Tredgett.
Absent: J. A. Brown, D. Yeomans, R. N. Saba, J. E. Owen.

SCHOOL DINNER

At the 56th Annual School Dinner this year, Schoolmen celebrated the 60th anniversary of the Engineering Society.

Around four hundred Schoolmen and guests gathered in the Great Hall of Hart House on Friday, November 2nd to hear the guest speaker, Mr. W. A. Osbourne, Vice-President and General Manager of Babcock, Wilcox & Goldie McCulloch speak on "Yesterday's Ideas and Today's Opportunities." Mr. Osbourne, in his timely and interesting speech recalled the founding of the Engineering Society (he was the Society's president in 1923-24) and applauded the idea of student government as illustrated by the Society.

Present also was Dr. T. Kennard Thomson S.P.S. '86, eighty-five-year-old founder of the U. of T. Engineering Society, who definitely won the hearts of all present with his kindly reply to the toast to the Engineering Society.

Scholarships and prizes for academic effort in the preceding year were presented by Lt.-Col. M. B. Hastings.

Frank Belshaw.

M. D. McCulloch, President of the Engineering Society

The Dean

ADDRESS AS DELIVERED, NOV. 2, 1945 AT THE 60th ANNIVERSARY DINNER OF THE OLDEST ENGINEERING SOCIETY IN CANADA THE UNIVERSITY OF TORONTO ENGINEERING SOCIETY IN THE HART HOUSE

T. Kennard Thomson, C.E. S.P.S '89 D.S. 1913

T. Kennard Thomson . . . Founder of the Engineering Society

Mr. McCulloch, very worthy president of the oldest Engineering Society in Canada; Mr. Osborne, it was a great treat to hear your interesting and instructive oration; Dean Young, it is truly delightful to know that You, as an Undergraduate, Graduate,

Professor, and now a Worthy Successor to that Great Man, Dean John Galbraith, have for 45 years been a great help and asset; Doctor Dunlop, one of the most outstanding of the Former Grand Masters of Masonic Lodges of Ontario; former Presidents of our Society, it is very gratifying to see so many of you here tonight; Fellow Members and Guests, of course, including, the Ladies, God Bless them.

This is from the bottom of my heart, as I had 11 sisters, one now living, and have a wife and two daughters.

A man was telling me about his grandchildren; I asked him if his wife was alive, he said "Yes." I told him that mine was too, that I had been married 57 years, thank God! But he said that he did not thank God!

A friend asked me how I accounted for the fact that I had 5 such intelligent children, so I told him that was easy, as I married a Toronto girl, daughter of a brainy man. As usual, I advise you gentlemen to get married young and marry a Toronto girl.

Allow me to express my appreciation of the men who made the founding of this, the oldest Engineering Society in Canada, a success (founded at the dinner on Hazelton Ave. November 1884).

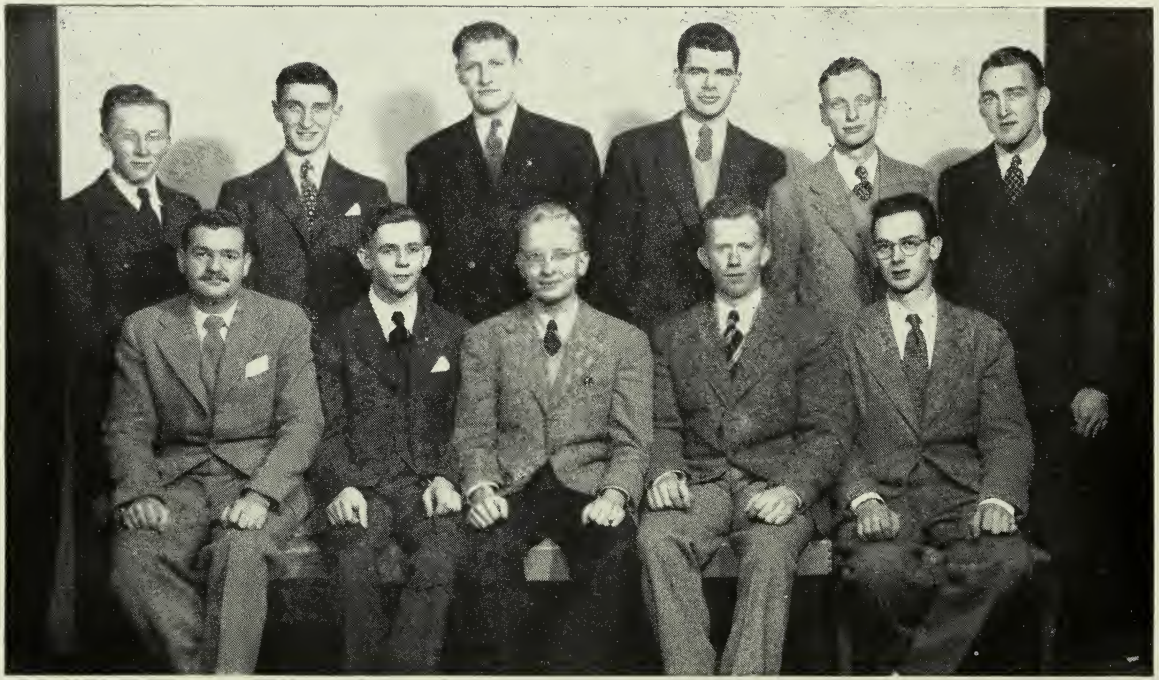
First and foremost was Principal John Galbraith (afterwards Dean) whose son, Major John Galbraith, a real chip off the Old Block, is here tonight. I shall always venerate the memory of John Galbraith, who was decades ahead of his time. I graduated at the head of my class, but if it had not been for him, I probably could not have graduated at all, on account of my deafness.

The most outstanding of the undergraduates of that time was Bruce A. Ludgate '85—now of Philadelphia. Ludgate was Chairman of the Committee of Three appointed at the dinner of Nov. 1884 to draw up the Constitution and By-Laws. He was the first Vice-President, etc. etc. Nearly all of the undergraduates of that time helped, especially my classmates. H. G. Tyrrell, now of Baltimore, the late E. B. Hermon and the late Robert Laird—also that exceptionally fine man and engineer, A. L. McCulloch '87. We insisted on Principal John Galbraith being President for 4 terms. Then H. E. T. Haultain '89 was the first undergraduate President, a worthy successor to President Galbraith. Dr. James L. Morris, Dr. Geo. Herrick Duggan and many other graduates were and are a great help. I graduated in 1886 and hope to continue being a student for another 20 years.

GOD BLESS YOU.

Getting Rid of Last Year's Props

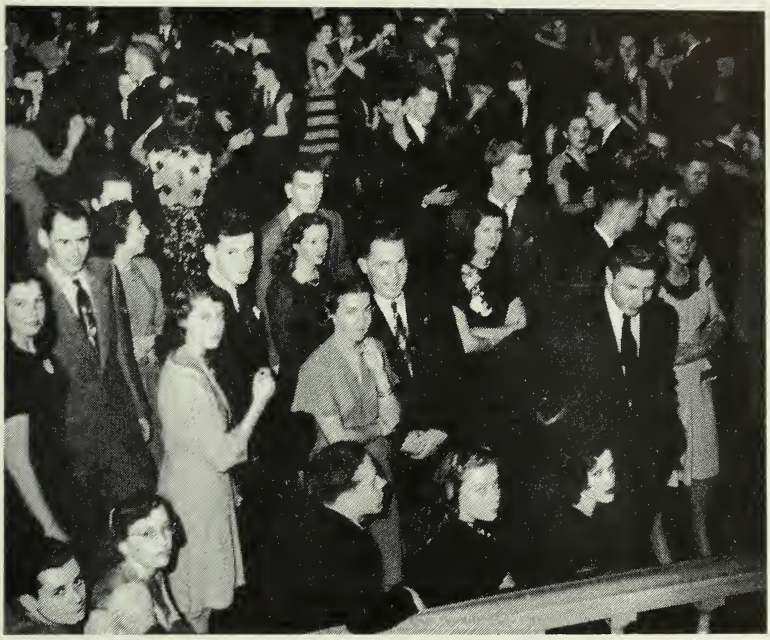
Burning of the Old Ship Columbo



SCHOOL-AT-HOME COMMITTEE

Back Row: G. R. Slemon, R. G. Tredgett, A. N. Campbell, G. A. Alison, P. Tillman, D. A. White.
Front Row: H. M. Laski, M. R. Davidson, F. Belshaw, M. D. McCulloch, J. B. Templeton.
Absent: J. A. Brown, A. J. Prell, A. T. Klassen, D. Yeomans.

SCHOOL-AT-HOME



The Dance Floor

On the evening of January 16th, the American band of Jerry Wald, direct from New York, gave the 1946 School-At-Home an undisputed first on the campus. The pre-war "big name" dance had returned in triumph.

Four orchestras held court on the Convention Floor of the Royal York Hotel as over 1,300 couples filled the three large ball rooms.

Besides Jerry Wald, his clarinet and that red hot orchestra, music was variously supplied by the bands of Ellis McLintock, Bob Gimby and Art Hallman. With trumpet, clarinet and song these three made music from the hottest of the hot to the sweetest of the sweet. From 9 p.m. 'til 2 a.m. the only question was, "What orchestra will we dance to, honey?".

School At-Home . . . Refreshment Time

Jerry Wald lived up to all the expectations. With a clarinet technique similar to the famed Artie Shaw, Jerry had at least half of his audience backed around the band stand all night.

Decorations by the Architects brightened the convention floor mezzanine with the story of a man from School. (Yes, the Casey R. was in it.)

A vote, taken a month before the big date, returned a clear majority in favour of informal dress. A precedent may have been set in this department.

The committee, which worked hard to give this dance the success it won, are to be congratulated for their effort.

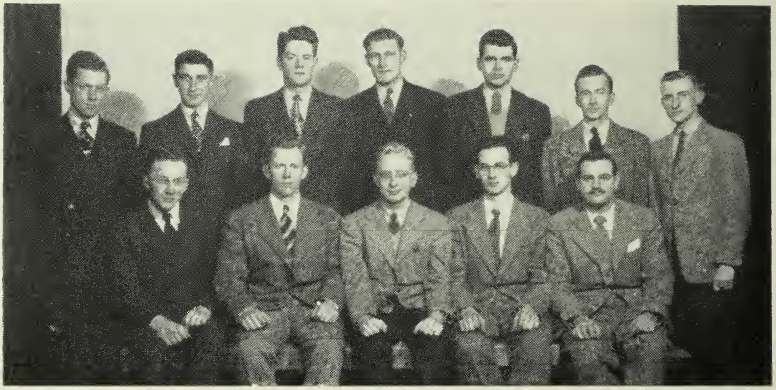
Add it all up and it becomes the best At-Home in many a long year.

The distinguished patrons and patronesses were: Dr. and Mrs. Sidney Smith; Dean and Mrs. C. R. Young; Lieut.-Col. and Mrs. W. S. Wilson; Prof. and Mrs. T. R. Loudon; Prof. and Mrs. W. J. T. Wright; Prof. and Mrs. E. A. Allcut; Prof. and Mrs. R. C. Wiren; Lieut.-Col. and Mrs. H. H. Madill; Prof. and Mrs. K. B. Jackson; Dr. and Mrs. R. R. McLaughlin; Dr. and Mrs. L. M. Pidgeon; Prof. and Mrs. C. F. Morrison; Mr. and Mrs. J. R. Gilley; Warden Bickersteth; Prof. and Mrs. J. W. Bain; Dr. and Mrs. G. B. Langford; Mr. and Mrs. W. R. Cowan.

F. Belshaw,
Chairman.

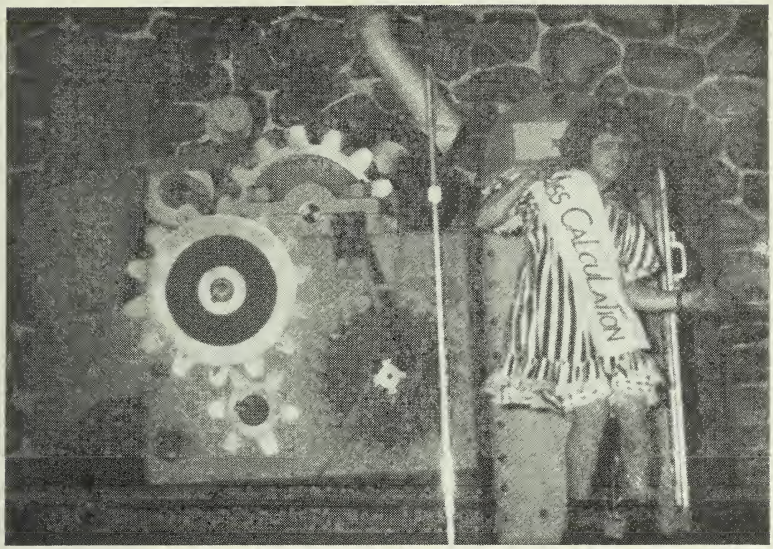
School At-Home Delegates

School At-Home . . . Delegates and Committee Members



SCHOOL NITE COMMITTEE

Back Row: H. A. Symes, R. C. Tredgett, G. Matheson, A. N. Campbell, G. A. Alison, N. L. Brown, J. Walker.
Front Row: G. R. Slemon, M. D. McCulloch, F. Belshaw, J. B. Templeton, H. M. Laski.
Absent: J. A. Brown, C. Fry, S. Dard.



Miss Calculation

SCHOOL NITE

Friday, November 30, 1945, school hung out its still damp and oh-so-neatly laundered script, on Hart House Theatre stage. Bill "Dreamer" McBride and Bill Flanagan, his Royal Attendant, cavorted through a series of scenes ranging from the Campus Date Bureau to a dream palace, a mechanical laboratory and back again.

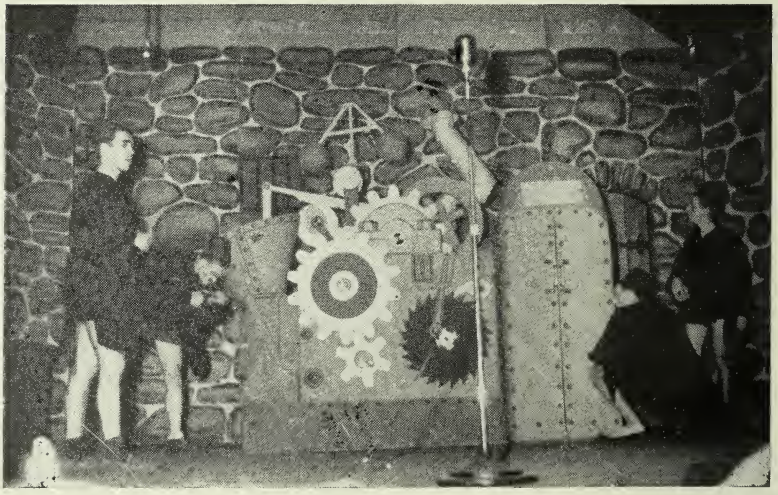
The predominant theme of a chronic woman shortage, which followed our intrepid schoolman even into his dreams, was finally solved by the "Four Professors of the Royal Lab." The professors, it seemed, for the purpose of manufacturing custom-built gals, had completed a gigantic infernal machine which, amid a weird complication of meshing gears, gyrating governors, and panting pistons, popped out its female products.

The action took place on sets which, due entirely to Gord Alison and Company, were the best ever seen on Hart House stage. Behind the scenes the stage crew, musicians, soundmen, lighting crew,

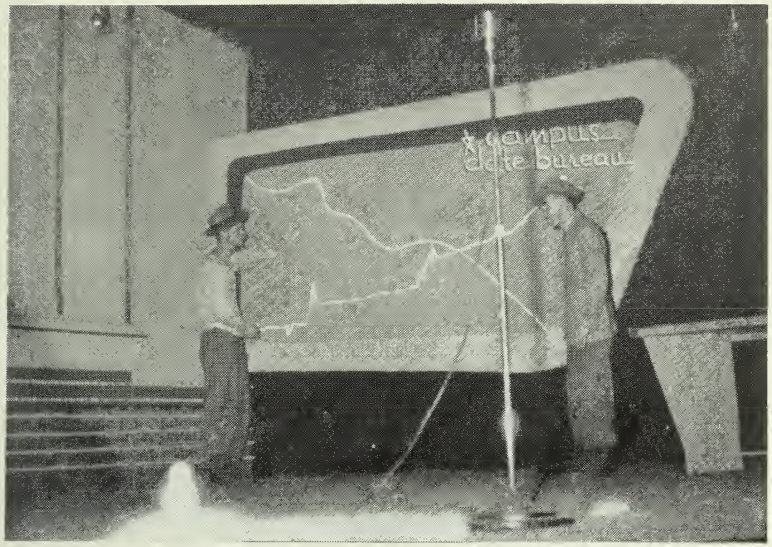
script writers, costumers (including School's women power almost 100%) and the entire School Nite Committee performed miracles of organization and diligence. The show went on without a complete dress rehearsal.

The able musical direction of "Whitey" Belshaw and his original number "Yours for the Asking" kept the crowd jumping from start to finish. Bill McBride, Bill Flanagan, Bob Sheppard and Paul Temple turned in priceless performances, worthy of professional standing. The approval of the staff, the audience and the criticism by the U.C. morality Squad, proclaimed School Nite Revue once more to be Varsity's best. As long as there is a School Nite, there will be School spirit!

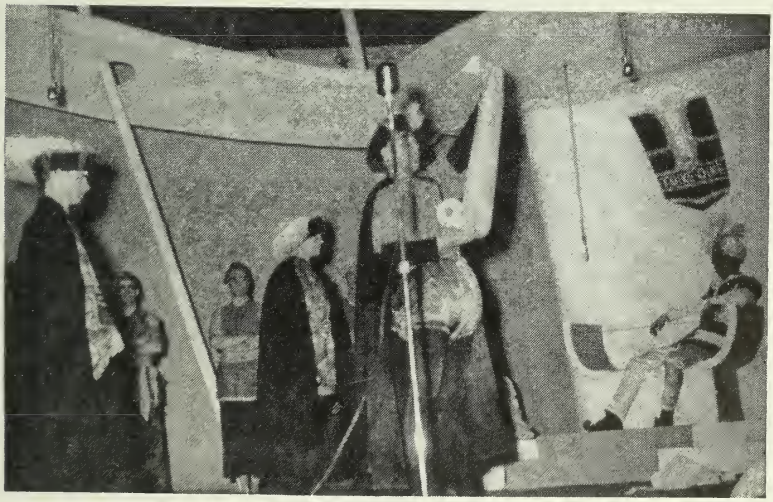
Jim Templeton,
Director, 1945 School Nite Revue



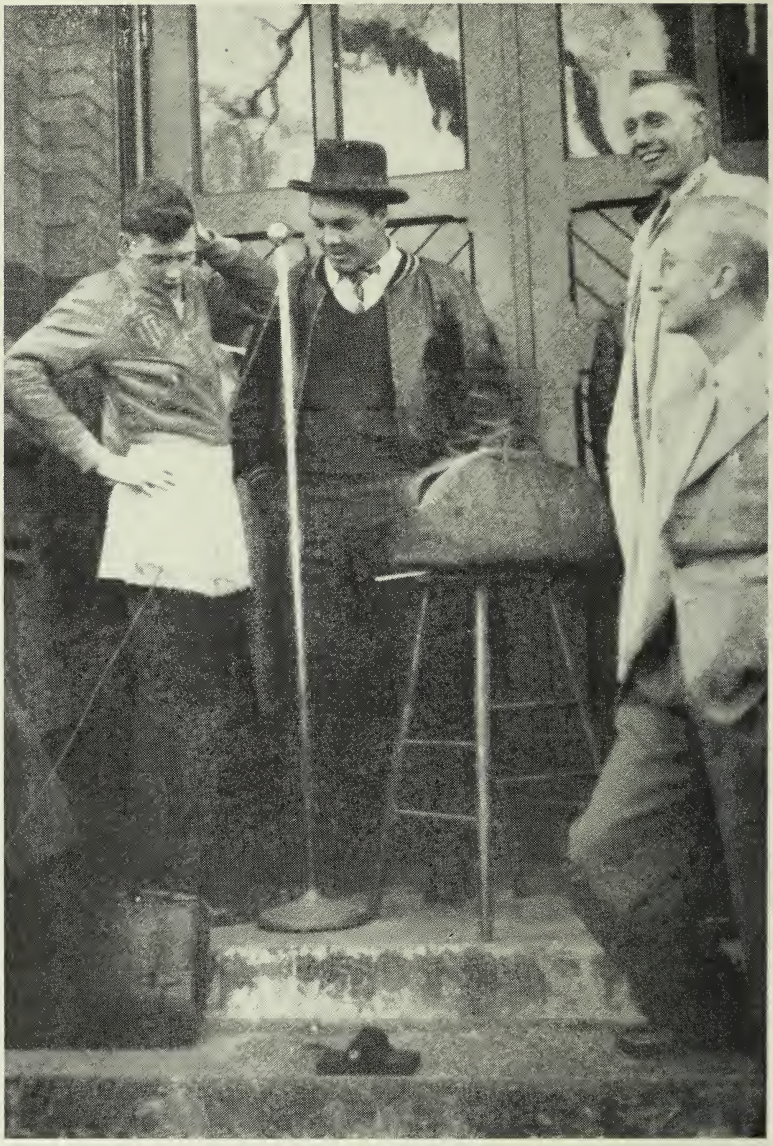
School Nite . . . The Four Professors



McBride and Shepp



The Royal Court Room



School Auction

SURVEY CAMP 1945

SURVEY CAMP '45

IT WAS A SAD LOOKING PROCESSION THAT LIMPED INTO A CERTAIN University establishment in Haliburton county on Gull Lake (Guess where!) that August week-end; but the old timers claim that the Civils and Miners look that way every year as they travel by every known means, and some even by bipedalocomotion.

You'd never know it was the same screaming crew that wheeled out of there in the B.B. and the Roach about 7:30 Saturday night. But once again they had cut their pace, that was when they met a certain Mr. H— standing on the porch of a well known summer resort. Undaunted they finally succeeded in establishing a beach-head and before very long had extended their front to the Boot, Wigamog and Jasper and even had a detachment in a certain Minden emporium. Marcia often said she'd rather be a tourist up there than a student.

Will anyone ever forget Russ. and that—trumpet, and Tredge & Johnny and the sessions around that broken down box of wires? Remember those bunks in the backyard episodes and the midnight dunking that always went with them?

Don't you love to sit back and reminisce (that means remember) about those long hours laying in the sun under a transit, those long refreshing swims and those long hours trying to get one of those jalopies into a couple of pairs of running shoes (21—450).

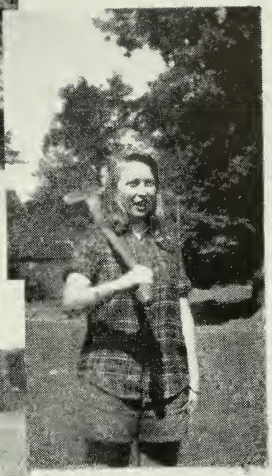
But the kiss-off was the bunkhouse brawl with the indian rope trick by Deer Russ Lodge and his native helper "Cleat" Phelan; the song by Party 206 and real live women in every corner. The cagiest play of all was G. S. W. moving his sleeping bag over to Stewart Hall (where the women's powder room was) so he could get away from the women—he says.

Mentioning G. S. W., brings to mind the polar bear club and its one female member, she was visited early each morning by a certain R. T. The lake sure was a great attraction, eh Red! Some of them still claim it was just as good as the Lodge and a lot closer—I'll have to admit that little Wande really was cute.

And in ending this dream—(say that reminds me of a certain nightshirt and its owner that ended up in the drink—pipe, hat and all—they still haven't found the nightshirt)—I'd like to mention the Colonial boys and what real sports they were—remember Hank and his high dive (?) and Tex Edward's Minden drug store debut.

There's only one fitting conclusion for this rambling, our '45 Survey Camp password—"You talked me into it."

SPIKE HENNESSY



SURVEY CAMP . . . CLASS OF 4T7

SURVEY CAMP 1945

SOPH — FROSH

THIS FALL DANCE, WHICH SCHOOLMEN ALWAYS LOOK FORWARD TO, was held in the Royal York Hotel, Friday, November 9th, 1945. A large number of Engineers of all years danced to the music of Bobby Gimby and his Orchestra. The dance proved to be a success due in no small part to the orchestra and leader. They played some fine dance arrangements and included feature numbers one of which was, "Themes of leading bands." Those present enjoyed them and we hope the same orchestra will be available for future school functions.

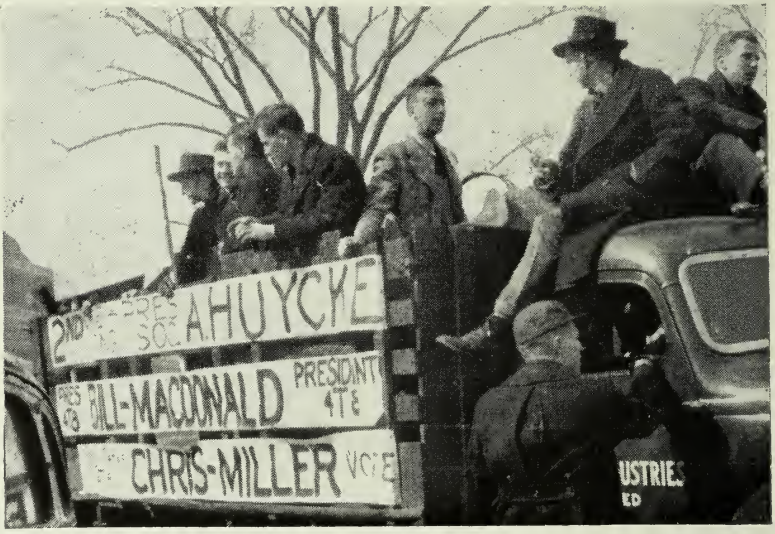
We were fortunate in having the following for patrons and patronesses: Dean and Mrs. Young; Professor and Mrs. Legget; Professor and Mrs. MacDonald; Professor and Mrs. Wolfe; Professor and Mrs. Melson; Dr. and Mrs. Jones; Dr. and Mrs. Breckenridge; Professor and Mrs. Wardell; Professor and Mrs. Dunbar; Professor and Mrs. Smith.

FRESHMAN RECEPTION

TUESDAY, OCTOBER 23RD, 1945 AT THE ROYAL YORK HOTEL, the freshmen were formally welcomed as full-fledged schoolmen. In the absence of initiations this year the dance did not hold as much significance as in former years. The Reception dance usually marked the acceptance of the frosh by the sophs after a good month of hazing and initiations. Trump Davidson provided the music for a very successful evening. Novelty dances were included and also a "So you want to lead a band" contest.

Patrons and Patronesses were: Dean and Mrs. Young; Professor and Mrs. Wright; Professor and Mrs. McLaughlin; Professor and Mrs. Cass-Beggs and Col. and Mrs. Wilson.

The New President of the Engineering Society . . . C. W. Daniel



Election Time

GRADUATE'S ALBUM
4T6

ENGINEERING SOCIETY

THE UNIVERSITY OF TORONTO

FOURTH YEAR CIVIL ENGINEERING

First Row: Prof. M. W. Huggins, E. R. Renouf, J. H. Ward, Prof. R. F. Legget, R. G. Paterson, C. E. Paget, L. E. Owers, K. E. Symons, Prof. T. R. Loudon.

Second Row: K. A. Brown, W. L. Booth, P. P. Boivin, P. S. Price, D. W. Cornell, C. V. Williams, H. C. Milne, J. W. Bradford, W. C. Finley, R. T. Sheppard.

Third Row: H. A. Jackson, A. M. Lount, C. Evans, T. H. Ivory, G. Evans, J. Farlow, G. I. Horner, W. T. McBride, F. L. Kahn.

Fourth Row: G. W. Simonson, L. Fiander, D. A. White, J. A. Gow, J. D. Bromley, J. F. Drohan, R. P. Hurley, P. B. Temple, D. C. Symes.

Fifth Row: J. W. Palframan, D. R. Steele, T. M. Phelan, R. R. Morrish, R. D. Litchfield, G. S. Boa, H. Jackman.

Absent: D. Blair, F. Fordyce, H. Jones, A. T. Klassen, J. C. Lomax, J. McLean, J. W. MacLaren, D. M. Mulholland, C. M. Nelson, J. W. Walker.

GRADUATING CLASS—MINING AND MINING GEOLOGY

Back Row: G. Farrar, E. Dafoe, M. McCulloch.
Centre Row: T. Morton, E. Hallet, Roland.
Front Row: Dr. Langford, Prof. E. Wolfe, Mr. L. Pancer, R. Scath.
Inset: Prof. C. G. Williams.

IV YEAR ENGINEERING PHYSICS—1946

Front Row: V. N. Stock, R. V. Smith, J. F. Allingham, Prof. C. Barnes S. J. Zabner, J. K. Hurwitz, F. W. Brown.
Second Row: J. L. Beharrell, F. C. Hooper, A. J. Elder, W. F. Hitschfeld, R. Thomas, A. A. Brait.
Third Row: E. J. Haluschak, J. S. Kyles, P. W. Neurath.
Inset: B. H. Stallwood, W. J. MacNeill, G. E. Noakes, Prof. K. B. Jackson, N. I. Heenan, N. Rostoker.

FOURTH YEAR MECHANICAL ENGINEERING

First Row: Prof. L. E. Jones, Prof. R. C. Wiren, Prof. E. A. Allcut, Prof. W. G. McIntosh, Prof. F. G. Ewens.

Second Row: J. Mews, A. MacGregor, S. Prifogle, A. Mark, J. Oliphant, R. Davidson, K. Noble, H. Laski, F. Belshaw.

Third Row: H. Wardell, G. Macivor, A. Traill, L. McIntosh, J. Mott, P. Purcell, J. Wainman, R. Singer, J. Illaszewicz.

Fourth Row: A. Rosenburgh, W. Deanna, E. Jung, J. Booth, B. Gosnell, G. Billings, H. Allan, D. Campbell, J. A. Jarrell, C. Clemence.

Fifth Row: G. Matheson, W. Kosick, J. Prothroe, L. Walker, J. Paget, W. Adams, G. Alison, B. Avery, K. Jay.

Sixth Row: M. Mulligan, W. Neale, K. Young, S. Lindsey, D. Price, M. Allan, J. Templeton, R. Moore, F. Emerson.

Seventh Row: J. Copeland, R. Milrod, P. Barker, R. Denford, J. Hassell, C. Vandecan, G. O'Sullivan, M. Harding, R. Powell, J. Northcote, W. Arthurs.

Eighth Row: R. Ball, D. McMichael, J. Marion, J. McEwen, L. Brown, F. Bell, J. Orr.

Inset: H. Denham, C. Wood, E. Dalrymple, A. Freeman, A. Campbell.

Absent: E. Durand.

GRADUATING CLASS ARCHITECTURE 1946

Back Row: R. H. Crawford, J. W. Storey, Mrs. I. Young, P. C. M. Keenleyside, E. H. Noakes, W. T. Pentland.
Front Row: H. Fliess, P. F. Tillman, L. G. Baker, Prof. E. R. Arthur, G. A. Robb.

GRADUATING CLASS 1946—CHEMICAL ENGINEERING

Front Row: S. Sandler, F. Kubath, Prof. A. M. Fitzgerald, Miss D. Birkett, Prof. J. W. Bain, Prof. E. A. Smith, Prof. R. R. McLaughlin, A. Hunt.

Second Row: A. Thomas, K. Turner, K. Irvine, W. Gall, K. Jensen, M. Stein, S. Sandler, K. Evans, J. Mayne, J. Gain.

Third Row: M. Phillips, C. Ramsey, F. Maltby, P. Aziz, K. Ahuja, H. Brown, C. Fowler, W. Grant, D. Stringer, H. Oliver.

Fourth Row: E. Chung, A. Johnson, L. Sugden, J. Wade, R. Partington, S. Cooke.

Fifth Row: H. Shanfield, J. Anderson, S. Spivak, G. Spergel, H. McKnight, H. McMurdo, R. Bishop, J. Rook, J. Newhouse.

Sixth Row: F. Moden, K. VanWyck, R. Dempster, B. Martin, J. Martin, R. McComb, R. Jonas, L. Bratty, D. Brecken.

Back Row: C. Patch, W. Fahr, Miss M. Beedham, W. Wilson, K. Andison, J. McDonald, R. Ball, G. Shaw, C. Metherell.

Inset: Prof. W. Boswell, Prof. Breckenridge, W. McDonald, G. Lowrie, J. Rosborough.

GRADUATING CLASS 1946—ELECTRICAL ENGINEERING

Sixth Row: P. Posen, J. O. Kentner, J. E. Kennedy, R. E. Binnington, E. E. Major, R. Robertson, D. R. McAulay, H. A. Judge, N. R. Buchanan.

Fifth Row: G. A. Mackie, W. Clarfield, S. Fine, L. A. Harris, I. G. More, L. W. Nelson, D. Guest, M. W. Stoddard, E. Green.

Fourth Row: D. G. Raynor, E. E. Sutton, A. P. Peikes, A. K. Meen, G. F. C. Weedon, K. A. Turner, J. O. Shaughnessy, D. Shopsowitz, W. F. Silk, M. Katchky.

Third Row: R. F. Seymour, D. H. Millard, J. E. Boyer, N. M. Duncan, R. A. Eckersley, D. F. Davis, H. A. Cohen, L. C. Fleming.

Second Row: A. C. Shamess, W. L. Clifron, J. A. McBride, A. J. Fort, J. E. Evans, S. Kozak, J. W. Shears, A. T. S. Jung, G. C. Baker.

First Row: W. Viner, Prof. J. E. Reid, Prof. V. G. Smith, Prof. H. W. Price, Prof. A. R. Zimmer, Prof. D. N. Cass-Beggs, Prof. R. S. Lauchland, G. R. Slemon.

GRADUATING CLASS—METALLURGICAL ENGINEERING 1946

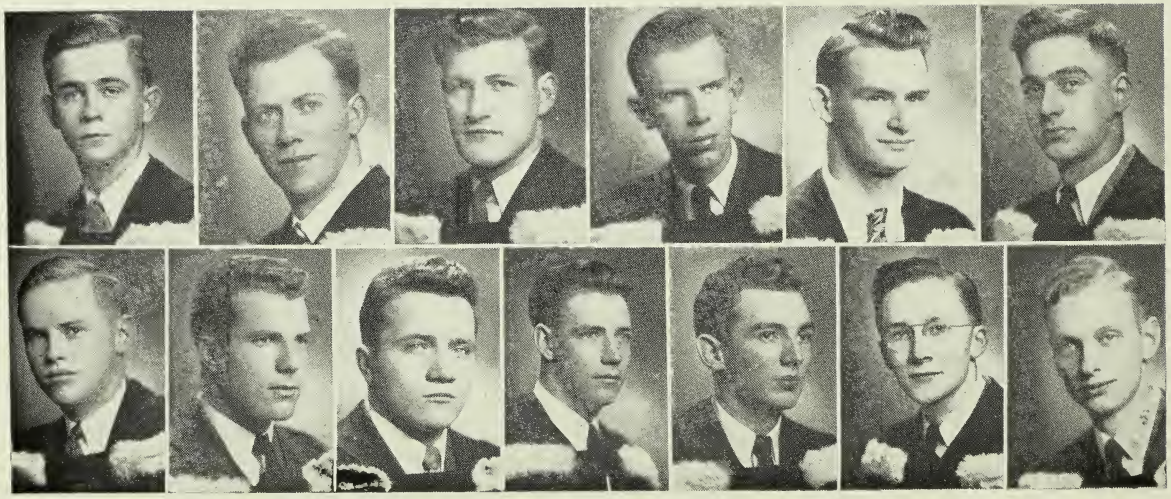
Front Row: Mr. H. Ross, Mr. J. Swinton, Prof. J. A. Newcombe, A. L. Cooper, Dr. L. M. Pidgeon, Miss J. Warnock, Prof. J. E. Toomer.
Second Row: A. T. Holman, K. Aszt, M. Stamps, K. McPhee, T. Howarth, G. M. Johnston, G. Runnels, D. McKerron, F. Schneider.
Third Row: W. S. Redman, D. Marhsall, T. A. Greening, R. R. Ehrlich, P. M. Gardiner, J. W. Kerr.
Fourth Row: J. H. Turner, W. A. Martin, J. G. Glyman.
Absent: D. L. Brignall, J. W. Shaver, M. T. Stewart.

GRADUATING CLASS 1946—AERONAUTICAL ENGINEERING

Front Row: G. Rosenthal, Mr. B. Etkin, Prof. T. R. Loudon, A. J. Pudsey, R. Shelley.
Back Row: T. Perry, T. Higgins, F. T. Moore, R. Davidson, D. Henshaw, F. Scott, C. Burrell.
Inset: E. Miller.

School Auction

The Annual Election Day Lunch at Hart House



PERMANENT EXECUTIVE CLASS 4T6

Top Row: M. R. Davidson, M. D. McCulloch, A. N. Campbell, A. Lount, J. Allingham, C. Burrel.

Bottom Row: S. A. Cooke, E. W. Dafoe, C. W. Evans, C. M. Johnston, D. Price, G. R. Slemon, P. F. Tillman.

4T6 — PERMANENT EXECUTIVE

FOR FOUR YEARS WE HAVE TRAVELLED THE WELL-BEATEN PATH TO School. Now with both anticipation and regret, we leave our Alma Mater, to branch out into new and untrod paths. The Class of 4T6 looks toward the future, fully confident that it will uphold the best traditions of the profession of Engineering.

An outstanding feature of our class has been its solidarity. This has been maintained through a close-knit web of friendship. Let us then strive to maintain and keep alive those friendships which we value so highly.

Soon our separate paths will diverge. But the class will live on as a solid unit under the leadership of its Permanent Executive. A record of names, addresses and occupations of all the graduating class will, with your cooperation be maintained. The executive will contact you frequently through the University of Toronto Monthly, our own publications, and by personal correspondence. We will meet soon and often at the ever-welcome reunions.

We ask then for a continuation of the cooperation and support which has characterized our undergraduate years. Let us keep our class, our School interests, and our friendships alive and active during the years to come.

M. R. DAVIDSON,
President.

SUMMER SESSION 1945

WE WERE THE BEGINNING. WE WERE THE FIRST OF A HOST of ex-servicemen who will flood the campus in the next few years. It was with determination rather than elation that we came to "Varsity" on April 2nd, 1945. We were going to school again after two, four, five years or even longer.

The short year was quite uneventful; it was mostly work with little play. The work was necessary and our small numbers, depleted during the year by R.C.A.F. and R.N. Fleet call ups, handicapped our social activities, as did the absence of the upper years which we missed very greatly.

The Warden's dinners in Hart House, for members of the Summer Session, were immensely popular and an interesting introduction to the traditions and lore of Hart House. We had two friendly little dances in Hart House and a final year party at the Savarin Hotel which will long be remembered by all survivors.

It was a hot summer—studying was difficult and there was a tremendous air of uncertainty about the whole affair. This past term we have been sophs in a "regular" year without the benefit of initiation, strife and the experience that goes with a normal first year. We look forward to joining our comrades in third year and that our and their future years may be as happy and as successful as the past.

Finally, we extend our thanks to the Faculty for their patience and interest, as well as for the individual assistance they have given us. Their attitude has been a practical and helpful "Welcome Back."

BOB ALDWINCKLE,
President Summer Session.

CLASS OF 4T6

As our class of 4T6 is the first to graduate in time of peace for over six years, we feel that we have a special obligation, a duty to perform in entering upon a new era of engineering. There are undoubtedly great opportunities lying ahead, for us to contribute materially to the future of Canada and of the Empire as a whole. There has probably been no period in the past as compared with the present in which opportunities are greater for the Engineering Profession. This situation is due to the fact that there have been a great many new discoveries and developments during the war which can be adopted to peace-time industry. As Engineers we should guard ourselves against false prophets and fanatical ideas being presented in this changing world.

From both an academic and social standpoint, the year 1945-1946 has been a happy and successful one. We were indeed fortunate to have one year of peace-time University life in which to enjoy campus activities free from the austerity of war. A great deal has been done in the year towards the reviving of former college spirit. Intercollegiate sport, with all its colour of rivalry, burst upon the campus once again. The Engineer's dances, which have always been unrivaled on the campus, are being revived to their former popularity. Let us make the graduation ball as successful as the year has been.

Our class may well be proud of the fine spirit of unity that has prevailed throughout the fleeting four years as undergraduates. The freshmen reception at Hart House and the subsequent "Whitney Hall Raid" gave the class a common ground which played no small part in the building of the fraternal friendship that reigns amongst 4T6'ers.

Now that we are about to leave the university and to navigate unknown waters of the future we must not feel that we are severing the bonds with the old school. We are sailing into a new world taking with us all that which we have gained during our sojourn at the University of Toronto. Let us all look forward to the renewing of old acquaintances in the future at the Engineering Alumni Association and Class of 4T6 reunions.

M. R. Davidson,
President 4th year.

4T7

ONE MORE YEAR OF UNDERGRADUATE LIFE DRAWS TO A CLOSE and our days as Juniors near an end. The enrolment this year was boosted somewhat by rcturning servicemen, who added to an already strong class.

I wish to take this opportunity of thanking the menbers of the staff for the interest shown and the time spent on behalf of the 4T7 executive. This co-operation was greatly appreciated and the goodwill that was shown helped your president to fulfil his duties for the year.

Many members of the class of 4T7 were represented on various championship interfaculty teams, which were successfu, in annexing the Mulock, Jennings, and Sifton cups for School, showing that brawn as well as brains helped to make up a balanced Class. This fact atones somewhat for the lack of attendance of third year men at some of our class functions.

The first of these functions was a 4T6-4T7 Christmas dance held at Casa Loma on December 18th, with music supplied by Roy Patterson and the Modernaires. Santa Claus distributed presents to the professors who each extolled on the virtues of their respective gifts. Those present were extremely satisfied with the proceedings and expressed delight in the prevailing informal and friendly atmosphere.

Our next social event was the Junior-Soph Frosh on Friday, February 8th, in the Banquet Hall at the Royal York Hotel. Bobby Gimby supplied the music and was received appreciatively by all attending. Ajax division was well represented and when an Ajax Schoolman finally won out in the elimination dance, the ovation from his compatriots was deafening.

At the present time, the year executive is discussing the possibility of holding a dance after the examinations are over, but nothing definite has been decided as yet.

I hope the incoming executive will receive the full co-operation necessary to carry out the duties required to ensure a successful year, and a memorable Grad Ball.

H. J. HAMM,
President, 4T7.

4T8

THE CLASS OF 4T8 STARTED OFF THE YEAR'S SOCIAL ACTIVITY at the Freshman Reception. We missed the opportunity of initiating the frosh this year—it was too bad because the boys spent most of the summer thinking of "flow-sheets" to make this initiation the best ever.

In November the Soph-Frosh dance was held at the Royal York Hotel. As in all School affairs, 4T8 showed up in large numbers. The evening of dancing to Bobby Gimby and his orchestra was very enjoyable.

The pre-Christmas party was held at Club Kingsway out Sunnyside way. The party was very successful and the floor show helped to entertain some 250 couples who were in attendance. The Junior Soph-Frosh at the Royal York Hotel ended our social activities for the year. Again Bobby Gimby and his orchestra provided the music.

At the time of writing, examinations are very near and the executive wishes success to all members of the Class of 4T8. May we also wish Bill MacDonald and his executive the very best of everything for next year. We are quite sure that your year will be a successful one because we know the lads of 4T8 will back you up in anything you wish to do.

FRANK GODFREY,
President 4T8.

4T9

THE SEVEN SHORT MONTHS OF THE SCHOOL YEAR THAT NOW LIE behind us will forever be remembered by the Class of 4T9. Back in September the problem of beginning an entirely new routine of living confronted us with very little or no time to adjust ourselves to civilian life again. Becoming accustomed to the confinement of lecture rooms and the necessity for concentrated study has been a difficult and arduous task for a great many of us and we owe a sincere vote of thanks to our Dean and the members

of staff for their understanding and whole-hearted interest in our well being, which has been shown in innumerable ways throughout the session.

As a part of the Class of 4T9, we have been extremely fortunate in beginning our engineering education on the Queen's Park campus and, I believe, it has laid the foundation for the "Skule Spirit" and the pride in "the Little Red Schoolhouse" which has always been an outstanding characteristic of the many men who have graduated from this faculty.

The extra curricular activities at S.P.S. and the University in general have proven to be of an exceptionally high standard. Social functions beginning with the Freshmen Reception and continuing through the Soph-Frosh, 4T9 Christmas Party, Jr. Soph-Frosh, School At-Home and the Spring Elections, were all indications of what is to come as wartime restrictions are slowly discarded from the campus. We were here just in time to witness the beginning of post-war intercollegiate sport and we will be able to observe its growth back to and beyond prewar status, not only from the side-lines but from the actual point of view of the participant himself.

Casting a glance forward, this Fall will see us scurrying around on the Ajax Campus, becoming acquainted with a slightly different routine but with the same objective in mind. In this we are fortunate again in that our class-mates attending "Skule" on that campus have broken trail in what is the largest project of the University's "Year of Expansion." Academic, Sport and Social aspects have all been developed to an admirable degree and I feel sure that life at Ajax will be found most satisfactory.

In closing I would like to thank the other members of the retiring Executive for their fine co-operation in making our year the success that it was and, also, to wish the new Executive the best of luck and the members of the entire Class success in reviving the old and seemingly almost forgotten adage that "the pen is mightier than the sword."

FRANK CRAWFORD,
President, 4T9.

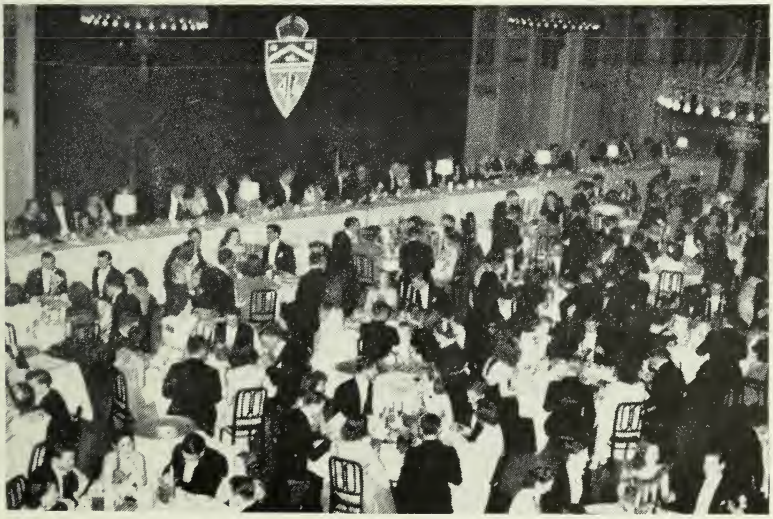
THE GRAD BALL

To the soft music of the string ensemble, the grads of 4T6 and their ladies dined in candle-lit splendour at the long-awaited Grad Ball on Friday, February 22nd, in the Concert Hall of the Royal York Hotel. This was the first "white tie" School function for the 4T6 class and the committee was successful in excelling even pre-war standards.

In spite of the still existing "foodless Friday" regulations, the chef came forth with an excellent menu highlighted by roast turkey with trimmings. The toasts to the University and to the Faculty were ably responded to in short farewell addresses by the President of the University and by the Dean. Gold keys and leather medals were presented to those who had distinguished themselves in School's service.

Later, Bob Gimby and his orchestra provided their best in music for dancing in the Crystal Ballroom. The blue and gold bandstand was alive with colour from the electronic lighting control which caused the colour and intensity of the lights to change with music volume.

The committee is to be congratulated on a completely successful finale to the social functions of a great year—4T6.



Grad Ball 1946 at the Royal York Hotel

Some of the Grad Ball Guests

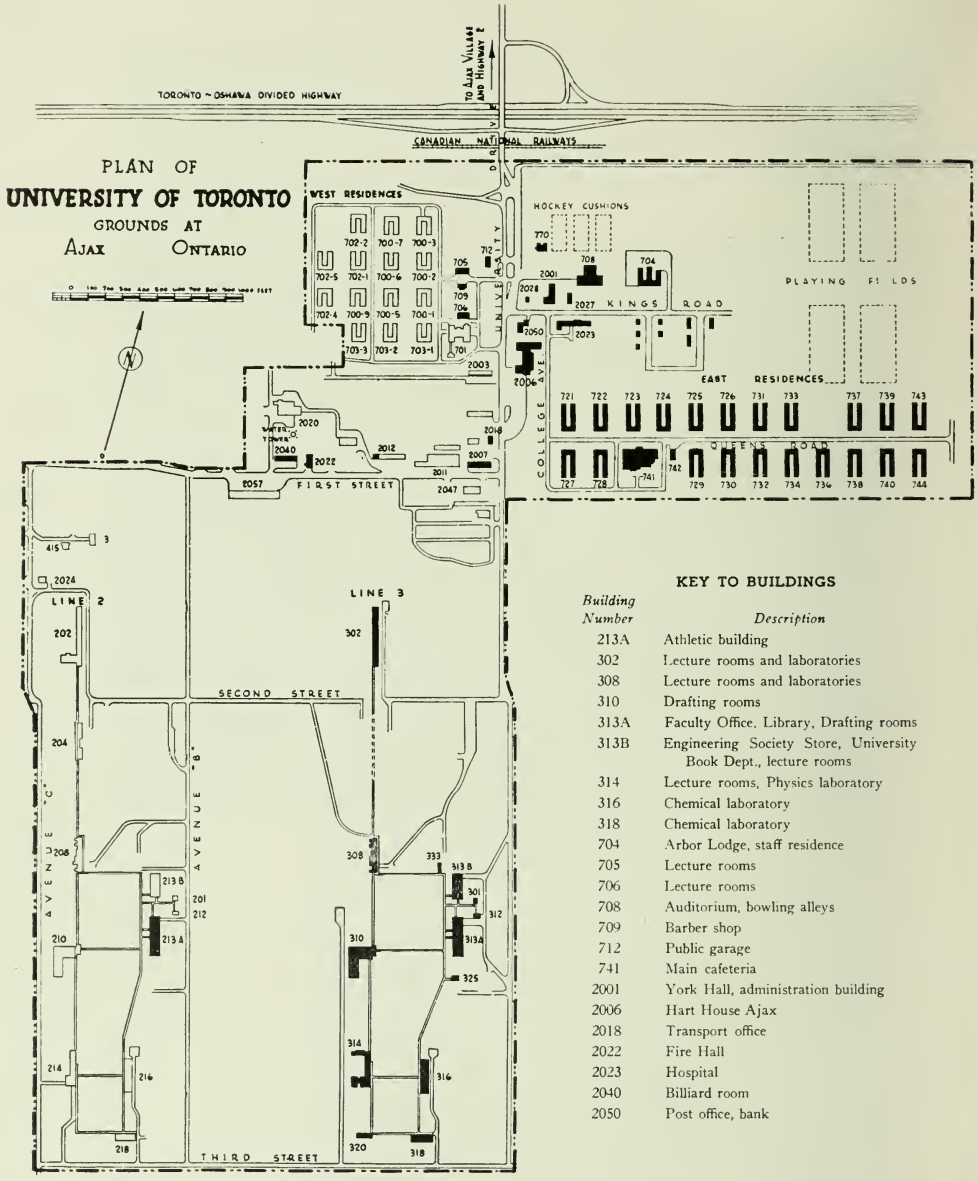
Professor Wright Awarding Leather Medals

AJAX

An Interview at Ajax

ENGINEERING SOCIETY

THE UNIVERSITY OF TORONTO



KEY TO BUILDINGS

Building Number	*Description*
213A	Athletic building
302	Lecture rooms and laboratories
308	Lecture rooms and laboratories
310	Drafting rooms
313A	Faculty Office, Library, Drafting rooms
313B	Engineering Society Store, University Book Dept., lecture rooms
314	Lecture rooms, Physics laboratory
316	Chemical laboratory
318	Chemical laboratory
704	Arbor Lodge, staff residence
705	Lecture rooms
706	Lecture rooms
708	Auditorium, bowling alleys
709	Barber shop
712	Public garage
741	Main cafeteria
2001	York Hall, administration building
2006	Hart House Ajax
2018	Transport office
2022	Fire Hall
2023	Hospital
2040	Billiard room
2050	Post office, bank

A Typical Residence

SCHOOL EXPANDS INTO THE COUNTRY

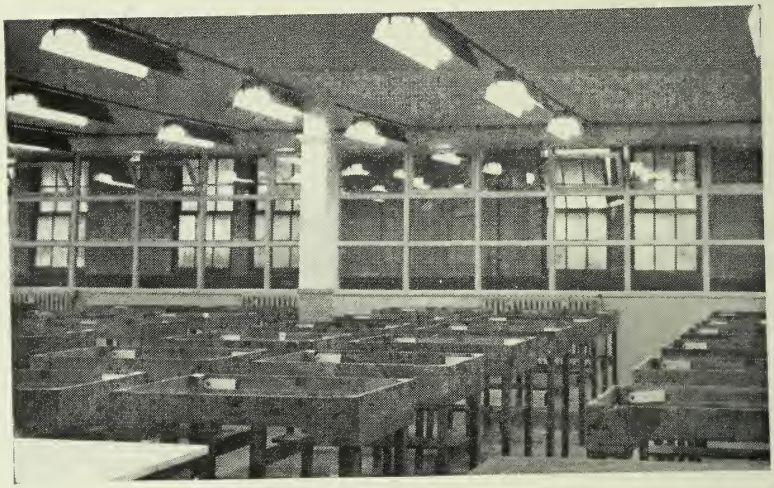
Following a lengthy study of all possible off-the-campus space suitable for the accommodation of the very large numbers of young people who had expressed the desire to embark on the study of engineering or architecture, a lease was finally arranged by the University about August 1, 1945, for a part of the shell-filling plant at Ajax, Ontario, 25 miles east of Toronto. On this site a vital war service had been performed by Defence Industries, Ltd., in the filling of some forty million shells.

The portion of the Ajax property leased by the University, which is exclusive of the area used by War Assets Corporation for storage of surplus war equipment, covers an area of 428 acres. Floor space to the extent of 700,000 square feet is included in the 111 buildings coming within the University lease. While some of these are unsuitable for academic purposes, most of them lent themselves to modification for class room and service uses.

By dint of extreme efforts on the part of all those charged with planning the reconstruction and the carrying of it out, students

were admitted to First Year classes on January 14th, 1946. Then, or shortly after, 23 lecture rooms, 13 draughting rooms, and 10 other laboratories were made available. While the exteriors of the buildings have been but little modified and suggest a temporary war plant, the class rooms, both for lecture and laboratory work, are convenient, well-equipped, well-heated, and well-lighted. Draughting rooms are equipped with 60-cycle fluorescent lights and chemical laboratories contain all that is to be desired for the work that is being done in them. With strict regard to economy and the temporary nature of the operation at Ajax, the class rooms have throughout been made remarkably attractive.

A fortunate circumstance was the availability of ample residence accommodation, and of about 1,420 students now registered at Ajax, nearly 1,200 live in residence. Students are assigned two to a room and additional accommodation for study is available in each of the residences which, as modified for student use, accommodate about 75 students each.



Architectural Draughting Room

Cafeteria service was available several days before the opening of classes. The University Health Service was operating with a 36-bed hospital at its disposal. Recreation facilities were available in the auditorium where basketball and bowling is accommodated and one of the larger buildings has been transformed into what is now known as Hart House Ajax, affording in some measure most of the well known facilities of Hart House in Toronto. Another building provides quarters for wrestling, boxing, tumbling, and fencing, and a full programme of sports has been organized through the activities of the University of Toronto Athletic Association. Personal services have been provided by the establishment of a tuck shop, a barber shop, a shoe repair shop, and a cleaning and pressing shop.

The Engineering Society operates a well-stocked store in which students may purchase draughting supplies, note-books, and such other items as concern them. The University of Toronto Press operates not only a bookstore, where all prescribed textbooks may be purchased, but also a small printing press. Characteristic services are provided by the Students' Administrative Council; there is a daily distribution of the *Varsity*, a student placement service, an ex-servicemen's emergency loan fund, and other useful features.

Due to the fact that the Second Year in the session 1946-47 will probably number 1,400 students, and the freshmen class entering at that time may be even more numerous, it is necessary to provide for the First Year and all of the Second Year, except students in Architecture, on the Ajax premises. This will mean that there may be 2,800 or 2,900 students at Ajax in the next regular session. Additional accommodation will be found in what was known as Line 2 of the shell-filling plant, and steps are now being taken to place more buildings in condition for academic use.

Academic operations at Ajax are closely co-ordinated with those of the Faculty of Applied Science and Engineering on the University campus. The Faculty Council, through the Dean, administers the academic work and is represented at Ajax by Professor W. J. T. Wright, Director of Studies, with a large staff, many of whom were put under training for about two months prior to the

commencement of instruction. Administration of non-academic activities is under the direction of Mr. J. Roy Gilley, Director of the Ajax Division of the University of Toronto. The close co-ordination of the two types of activity is maintained under the overall direction of the President of the University.

Room in a Residence

UNIVERSITY OF TORONTO AJAX DIVISION

DURING THE SUMMER MONTHS OF 1945, THE UNIVERSITY authorities were faced with the difficult problem of providing accommodation for almost double the number of students that had been registered in the previous year. Through the splendid co-operation of the Dominion and Provincial Governments with the University, part of the huge Ajax shell-filling plant was acquired as an emergency measure to make room for the large influx of ex-service men. Colonel W. E. Phillips, Chairman of the Board of Governors, made the announcement in August that Premier George Drew had assured the University that his Government would underwrite the Capital and additional current cost of operating the Ajax Division.

There were early indications that there would be a relatively large number of ex-service men register in first year Applied Science and Engineering. Consequently, the President, Dr. Sidney Smith and Dean C. R. Young in consultation with other University officials decided that first year students in Engineering would be accommodated at Ajax. The heavy task of converting the buildings of this huge war plant for University purposes was commenced immediately. In spite of the tremendous difficulties which faced all University departments concerned, the first session of the Ajax Division commenced on the scheduled date—January 14th, 1946. Of the 1418 students registered, 9 are women. 1180 have taken up residence. A few married ex-service men live in the Wartime Housing village and others commute daily.

The responsibility for the general administration of the Ajax Division falls on the President as does all University departments. The administrative officers at Ajax are the Director, Director of Studies, the Deputy Bursar, and the Deputy Superintendent of Buildings and Grounds. The area taken over by the University comprises 428 acres. In the southern part are located the lecture rooms, the laboratories and drafting rooms in what was formerly known as Line 3 when the buildings were used as a shell-filling plant. There are 28 lecture rooms accommodating approximately 100 each; 12 drafting rooms with a total of 750 drafting tables; 7 Chemical laboratories giving accommodation to 400 at one time. All these rooms have special lighting and are painted in most at-

tractive shades. Several lecture rooms, Administration Building, the Residences, Cafeteria, Hart House Ajax, Hospital and other buildings are located in the northern area.

Some of the streets and buildings have been re-named. The road from No. 2 Highway leading direct to the academic buildings is called University Drive and other streets have been named Kings Road, Queens Road and College Avenue. The Administration Building is called York Hall; the building that houses Hart House activities is called Hart House Ajax; the former Staff Hotel is called Arbor Lodge and the students in the various residences are giving more or less colourful names to each of these buildings.

The Ajax Division is in reality a self-contained community with its own Post Office, Police Department, Fire Department, Circulating Library, Chapel, Water Works, Steam Plant, Hydro Sub-Station, Hospital, Staff Hotel, Laundry, Cafeteria, Student Residences, Staff Dormitories, Barber Shop, Tuck Shop, Billiard Room, Shoe Repair Shop, small Press, Playing Field and in addition, there is a Bank and a public Garage. It will be seen that facilities have been provided at Ajax for all the organizations that make up the full life of the University student in Toronto.

Soon after the session began in January, the Engineering Society arranged for the first year elections and after a spirited election campaign Mr. M. McAuliffe was elected President. He and his able executive were faced with many pressing problems which have been handled with great success.

Hart House Ajax, centrally located, is admirably equipped to provide for the development of the traditional Hart House activities; the Athletic Association have made a splendid contribution with the facilities available, basketball, hockey and bowling being the most popular sports during the winter months—playing fields' when completed in the summer of 1946, will be ideal for outdoor sports; University Health Service has its headquarters in the hospital building which has accommodation for 25 beds. With its X-Ray and other equipment, students are assured of medical attention of a high standard; the Circulating Library gives every opportunity to the students and staff to enjoy good books of wide interest; Sunday services have been held in Hart House Ajax under the direction of the Chaplain, the Rev. Carl Swan; an enthusiastic group of musicians have created a very fine band; each of the 16

residences has arranged a house dance which has in large measure answered the need for social life.

The Ajax Advisory Bureau for ex-service students is modelled on the organization in Toronto, thus offering the same facilities. Assistance in the solution of many personal problems has been the record of the Bureau.

Thus in a few short weeks, a real Ajax spirit has been created and a fine University community life made a reality.

J. R. Gilley, *Director.*

Open House at Ajax

AJAX ENGINEERING SOCIETY STORE

AJAX PRESIDENT'S MESSAGE

AJAX. What did this name mean to you six months ago? Perhaps you thought of it as a ghost town that had been erected and would remain as an epitaph for a once proud Munitions Factory. Perhaps you thought of it as that "wild goose chase" that the University of Toronto was thinking of launching. Perhaps you just didn't think of it. Regardless of your former thoughts, however, we are firmly established today, and ten per cent of the University of Toronto is enrolled at Ajax. Next year twenty per cent of the total enrollment will find themselves, not at Queens Park, but shouting "Toike Oike" at Ajax.

As all the "Jaxs" are potential engineers, the Engineering Society is the main Student Executive Organization existing at the moment. The various Engineering Clubs were not set up this year, and instead of the Club Chairmen, the various Residence Chairmen make up the Society's body. Apart from this Ajax is an exact replica of the Toronto Society.

The relationship between the two bodies is extremely difficult to express in words. If you were to ask, are we one body, the answer is yes. If you then ask, are we an overgrown year executive, the answer is no. I believe the best answer, or rather, the best phrase that I can use to explain the relationship is perhaps mutual understanding and common ordinary horse-sense. We both follow the same constitution and keep in constant touch with each other through Bob Aldwinckle, the hard working liaison officer. The Toronto Society keeps a fatherly eye on us and Murray McCulloch and his colleagues are ever present to give us any advice or help that we require. They got the ball rolling for us, and have given us the stick to keep it going.

The Ajax Society, however, administrates the problems pertaining to Ajax. These, as most of you realize, are many and varied. We are forced to tackle many problems, which, although strictly speaking are not Engineering problems, we feel never-theless bound to tackle. The first of these was transportation. We feel that we have eased the situation considerably, and while it is a long way from being extremely satisfactory, it is a step in the right direction. This point becomes debatable at times, however, whenever the "Green Hornet" or "Grey Hearse" struggle into view.

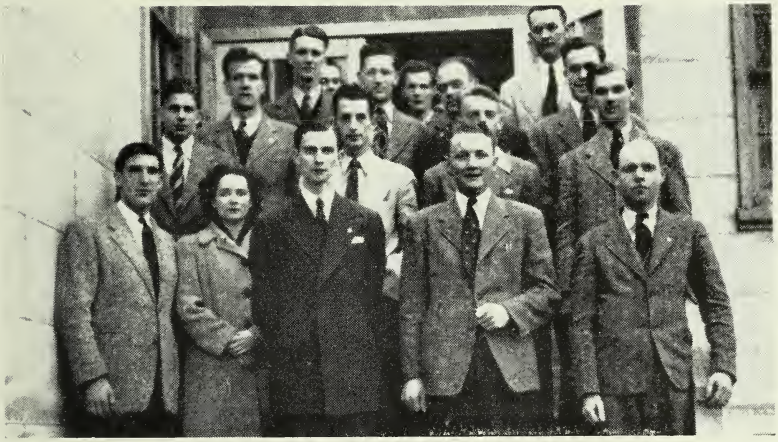
The social life of Ajax, although difficult, under the able direction of Gord Beatty has not been overlooked. Faced with such trivial details as no suitable accommodations for dances, except in Toronto, and Toronto accommodations being booked well into 1947; transportation difficulties again rears its ugly head; but all have been met by Gord and his very able committee, and somehow surmounted. In fact, grabbing the bull by the horns, Gord not only secured accommodations for this year, but managed to reserve bookings for next year as well.

Ted Hodgson, with the indispensable help of Dorothy Clark, Eileen Frost, Gwen Scott, and Bill Daniel, has made the Engineering Stores an extremely efficient organization, although Nick Prochnicki may not agree with me as Nick is the man who looks after the figures, and Ted and his gang provide most of his work. Mrs. Clark should receive a special bouquet for all the hard work that she put in in launching the Ajax Division of the Society, and we all miss her as she has deserted us to take up marital duties as F/L Clark has finally found the "Ticket" that many of us spent years looking for.

Let us not forget the name with which every Skule man for a good many years is very familiar. That is Professor W. J. T. Wright. Professor Wright, who has helped so many of our predecessors, has given unstintingly of his time, and whenever things looked black, his vast experience was always present. The success of the Society at Ajax belongs mainly to him.

At the moment, a very healthy "Skule spirit" exists at Ajax, and our main effort is directed towards making other faculties Ajax conscious. Next year twenty per cent of the University will be registered at Ajax, and while we realize that we cannot get along without their help, we hope that they will realize that they cannot afford to forget about us.

M. J. McAuliffe.



Ajax Executive

Eating Time

Ajax Girls at Work

RESIDENCE 723

ON JANUARY 14, 1946, RESIDENCE 723 IN COMMON WITH (21?) other Residences again sprang to life. Halls which had echoed to the voices of war workers now resounded with discussions of the relative merits of electrical and metallurgical courses, of the Lancasters and Liberators, and the best "pub" in the north of England.

Under the able guidance of Housemaster Bob MacGilchrist, a U. of T. man, the organization of Residence life proceeded apace.

A house committee was formed to administer internal residence problems: Chairman, Jim Vance; Vice Chairman, Ted Hodgson; Secretary, Jack McLean; Athletic Representative, Ron Hall; Social Convenor, Jan Reid; Member-at-Large, Pat Heenan.

Before many weeks had passed, study rooms vied in popularity with the "tea swindle" in the kitchenette.

Athletic activities interested most members. An early lack of wins by the hockey, basketball, bowling and volleyball teams was more than made up by the enthusiasm and vigorous play of the teams, evidenced by an average of an injury a game for the hockey team.

To ensure that all members would be well acquainted an early social gathering was arranged in the form of a banquet at the Genosha Hotel, Oshawa. A complete success was achieved in this objective due largely to the excellent organization work of our genial social representative.

The members of the house have settled down to become keen undergrads. They have developed unusual talents in various fields early in their engineering career. With such an early display of talents, the members of Residence 723 will undoubtedly stand forth in the annals of Engineering and uphold the tradition of the Skule.

JIM VANCE,
Chairman.

HOUSE 724

MIDNIGHT, JANUARY 14, 1946, MARKED THE END OF A HECTIC DAY for the seventy-two fellows of House 724.

Questions prevailed—What's the score? Where do we eat? When do lectures start? How do we get to lectures? Is my card pink or salmon? (Colour blindness seemed to have reached epidemic proportions.) Much thanks must be given to our housemaster, Ian Clark, who was deluged with the above questions. Since most of the fellows had not even met their own room mates before, the first evening was spent just getting settled. The Bridge addicts soon, however, began to line up around the card tables in the common room and the broader aspect of getting to know the fellow students was under way.

It wasn't long before we were confronted with the necessity of electing a house executive the duties of which no one was certain until well after the elections were held. Jokes were at a premium during the campaign speeches and the fellows sure knew their onions when they elected Dick Birch as Social Convenor. Other members of the Executive are: Chairman, Vernon Schneider; Vice Chairman, Norm Tower; Secretary-Treasurer, Jim Richmond; Athletic Representative, Jim Crang, and Member-at-Large, Gord Hunter.

The Athletic Representative, Jim Crang, got to work and 724 is represented in the Hockey, Basketball, Bowling and Volleyball leagues. During the first month we stood fourth among the Houses contending. We didn't bother to win the pennant in February as our budget wouldn't allow us to buy a flag pole until March.

Speaking of pennants, one should go to Dick Birch for the successful party held on St. Valentine's Eve. Since most of the boys were far removed from their own stamping grounds, and transportation out here being what it is, he decided to arrange blind dates. Thirty lovely "Vicettes" were invited as well as fifteen of the tried and true from 721. Despite last minute cancellation of the sleigh-ride due to copious quantities of liquid sunshine, it was agreed by one and all that the party was a howling success.

We have been here six weeks to date, and the general feeling prevails that all is confusion. Never-the-less we hope to see the light in time and remain as the same body in House 724 for our second year.

VERNON SCHNEIDER,
Chairman.

COMMON ROOM MEETING AT AJAX

RESIDENCE 726

AT THIS WRITING, THE MEN OF AJAX HAVE ONLY BEEN SETTLED some eight weeks and consequently the tabulation of house activities does not present a very formidable task.

At the house organization meeting held on January 22nd, the following executive was elected: Chairman, Don Brown; Vice-Chairman, Allan Clews; Secretary-Treasurer, Graham Kemp; Social Convenor, Russ Rivers; Athletic Representative, Paul Schutte, and Member-at-Large, Les Hudson.

Our first social function was strictly stag. Russ Rivers, with his capable henchmen, Bud Smale, Doug Johnson, Ted Hagerty, and Ross Anderson, presented an excellent programme of skits and games. Later, a java and sinker, story and song session ensued.

It was followed by a dance at which the men entertained the Ladies of Residence 721 and Whitney Hall on March 8th. It was a howling (awoo-o-o-o) success. Judging by the number of little black books that made their appearances, it would appear that the "Ajax-At-Home" Date Bureau is wholly unnecessary!

Sports—ah sports! Well the kindest way to put it is that we don't *yet* hold the Dean Young pennant. When the first standings were posted we were just nosing out the girls—and the only reason for that was that they hadn't played a game yet. The next recap showed us up in the middle of the pack and still climbing, however. So by the time you read this, who knows, maybe the pennant will be hanging in our common room (it says here).

A bridge tournament is in full swing right now with the competition keen but clueless. Also under consideration is a name for the house. Several original suggestions have been advanced and the matter is still undecided.

To conclude, on behalf of all the men of this residence, I wish to thank our Housemaster, Claire Burke, for the capable manner in which he organized the house until the house committee took over—and for his help on those sketch problems.

D. J. BROWN,
Chairman.

LIFE WITH ROY IN 727

WITH AMBITIONS HIGH, WE SEVENTY ASPIRING SKULEMEN became inmates of Residence 727. In true Engineering style, we ventured out of our inner sanctums and became acquainted with our fellow students. Bull sessions were in order, and during the all night wafting of wind we gradually decided on our House Leaders to be.

During the second week those who had survived the turmoil of getting settled took the bull by the horns and elected the House Executive. Don Holman was elevated to the lofty heights of Vice-President; Mac Campbell won Secretary-Treasurer's office with the quip, "I can write"; Dunc Marshall became Member-at-Large; elusive Doug Haldenby accepted the post of Social Convenor, while Bill Spence became guardian of the Athletes as our Athletic Representative.

As January drew to a close, Haldenby and his cohorts brought the feminine touch to 727 in the form of a most successful dance. A good time was had by all—even George, for he slept.

With Bill Spence at the helm, our Sports Programme soon became organized. Our ex-pinboy, Ray Morris, whipped the three Bowling Teams into shape. Then along came "Tiny" Bobby Westman with his six-footers to form the Volleyball Team, and Strutting out of nowhere our own Jimmy brought his mighty giants of Basketball. As for our Hockey Team, it is under the watchful eye of young Spence.

To date many friendships—lasting we hope—have sprung up amongst the fellows of 727. Roy Lacey, our Housemaster, watches over his seventy odd charges with a Fatherly eye. Gilroy and Bruce have become inseparable. "Scoop" Nathan and Elmer are our Literary Genii. Jackson and Jim regularly cut up with the Pinups.

As yet our future plans are a bit hazy, but from latest reports our Master Minds are busy on the crystal ball and excellent results will be forthcoming.

J. J. ROE,
Chairman.

FARADAY HOUSE

OUR RESIDENCE, DEAR OLD 732, HAS BEEN NAMED AFTER Michael Faraday, the great scientist and experimenter who is responsible for many of the discoveries that have led to our present state of electrical development. His pioneering in the field of electricity paved the way for many future developments. It would appear that at one time Faraday applied for the chair of Natural History at the University of Toronto but was not accepted.

On January seventeenth, the residence elected a House Committee of a chairman, vice-chairman, social convenor, athletic representative, secretary, and member-at-large. It is the responsibility of this committee to organize all sports, social and other activities for the residence. This it proceeded to do with a will.

With Ken Mohun, our athletic representative, in charge of sports, our hockey teams, volleyball teams, basketball teams, and bowling teams are creating an enviable record, and at all times maintain their position very near the top. Their success is very gratifying to all concerned.

On Tuesday, February nineteenth, we had our first social event: a dance in the common room of our own residence. Tom Maxwell, our social convenor; Dave Proctor-Gregg, our vice-chairman, and Chris Flannigan, our secretary, are to be heartily congratulated on the magnificent success that was achieved. Skits by Big Bill McGeachie, our member at large, Dave Proctor-Gregg, and others proved to be highly amusing. We were very fortunate to have a good number of Wymilwood Hall students (female) as our guests. At present this dance constitutes the highlight of our social life.

Many and varied are the future plans for the Residence. It is our intention to set up a hobby room and a Kitchenette equipped with toasters, teapots, coffee makers and the necessary dishes and silverware. It is hoped that our house spirit, and school spirit, will thereby be strengthened and fortified.

P. A. CHAREST,
Chairman.

HOUSE 733 AJAX

ON JANUARY 14TH, 1946, THE FIRST STUDENT BODY ENTERED the Ajax Residences and House 733 received its members. Mr. G. N. Nixon, as Housemaster, was on hand to greet these men who had come from all parts of Canada and the United States to study, enjoy relaxation, and live under the same roof. Thus was 733 born. May she live long and happily.

A few evenings later, under Mr. Nixon's chairmanship we enjoyed our first formal meeting and elected our House Committee. After all nominees had vigorously and humourously expounded their best political speeches, Mr. Nixon was only too happy to hand over the running of the House to Mr. G. O. Machum, Chairman; Mr. W. Inman, Vice-Chairman; Mr. R. E. Crysler, Secretary-Treasurer; Mr. R. Gerald, Athletic Representative; Mr. W. Armstrong, Social Convenor, and Mr. D. Hart, Member-at-Large.

In this first year at Ajax, House 733 has been well represented in intramural sports. All of the members are enthusiastically entering into the competition.

We are well represented in Bowling—six teams—to say nothing of the three teams entered in Basketball and the teams entered in Volleyball and Hockey. With the emphasis being placed on everyone entering into the games, 733 is holding its own in the competition. "A" Basketball Team heads its loop, while three of our bowling teams are in a close race for first positions in their groups.

With the coming of Spring, we will see 733 actively engaged in Softball, Soccer, Box Lacrosse, Borden Ball, Tennis and Horseshoes.

The gala event so far on the Social Register of our residence was the Dance which took place on March 1st. It was enjoyed by all who attended and the fellows all regretted saying goodnight to our lady guests from the School of Nursing and Victoria College. If the pocket books can be squeezed we will have another dance in the near future.

Played night and day (in spare hours?) is that great game of Bridge. A tournament is in the offing with prizes to aim for as well as being the Champions. Chess and checkers are next in popularity to be enjoyed in our house. For those who don't play, the Common Room provides all the favourite magazines and newspapers.

Although the term is but half over I would like to take this opportunity to thank the House members on behalf of the Committee for their loyal support of all our undertakings and for the House Spirit to which they have given birth within these walls.

G. O. Machum,
Chairman.

Ajax Musicians at Practice

RESIDENCE 734

THE HOUSE EXECUTIVE CONSISTS OF THE FOLLOWING: HOUSE-master, V. R. Davies; Chairman, Lyon Sacks; Vice-Chairman, Mike McAuliffe; Secretary, Joe Brigham; Social Convenor, Roy Clarke; Athletic Representative, Jack Robson; Member-At-Large, Harry Creighton.

The outstanding social event of the year at 734 was the Valentines Dance of February 14th. The Common Room, decorated with select illustrations from a popular men's magazine and crepe hearts and trimmings was filled to overflowing with the eager engineers and their demure damsels. The bus-load of girls from Whitney Hall arrived on time despite the flood at Pickering Bridge. Some of the girls from Ajax Village even arrived a little early, much to the embarrassment of one poor chap who left last minute cleaning up operations a little too late in the wash room the girls were to use. Towards the close of the evening, the Engineers swung into a lusty *Toike Oike* as well as a choice little ditty about Whitney Hall that caused more than one shy feminine blush.

House spirit of 734? Too much of it. It usually begins to assert itself shortly after mid-night in forays to various rooms for the main purpose of interrupting sleep; but sometimes things really liven up. For example, there was the time we had the snowball fight in the Common Room!

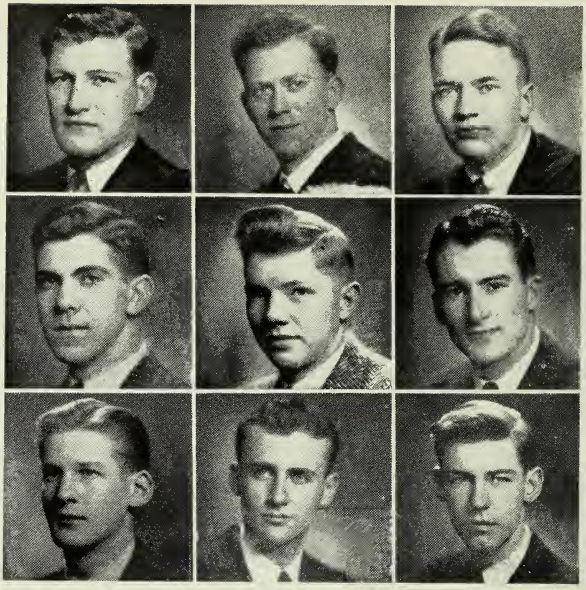
734, although not at first place in the intramural standing, is well represented in the sport field. There are two basketball teams, a hockey team, three bowling teams, and a volleyball team. Jack Robson, captain of one of the basket-ball teams is also a star player on the U. of T. Ajax team.

LYON SACKS,
Chairman.


FACULTY OF
APPLIED SCIENCE AND ENGINEERING
SCITE ET STRENUE

SCHOOL ATHLETICS
1946

ENGINEERING SOCIETY
THE UNIVERSITY OF TORONTO



ATHLETIC ASSOCIATION EXECUTIVE

Top Row: A. N. Campbell, M. McCulloch, G. S. Boa.
Centre Row: H. J. Ham, K. Hendrick, W. D. Lawrence.
Bottom Row: J. McReynolds, J. McMichael, J. A. Swan.

ATHLETIC ASSOCIATION

ANOTHER SCHOOL YEAR HAS DRAWN TO A CLOSE, AND WITH IT athletics on the campus also disappear.

As we review the past year—a year full of changes, chief of which was the return of Intercollegiate sport to the Canadian Campi—we once more see the athletics of School outdoing their rivals from all the other colleges.

More teams and individual competitors were sent from S.P.S. into every sport than any other college in the T. A. Reed Trophy race, and these boys brought home more championships than any other individual college won. Included in these championships were those "big three" rugby, hockey and basketball, with their respective "mugs", the Mulock, Jennings and Sifton Cups.

Although a reallocation of points in the T. A. Reed Trophy race was reputedly made, we haven't seen much evidence of it, when, with a record such as that above, we can't even come close to the top. Another change in points will have to be made in the fall, and we can still hope.

To members of the executive, managers, coaches and players, deepest thanks are in order for the co-operation received, there was never any better.

For next year, the best of luck to all, you couldn't have a better president and executive, so get behind them and push.

A. N. CAMPBELL,
President, Athletic Association, 1945-46.

J. Bromley

BRONZE 'S' AND PHENE MEMORIAL

For the fourth time in the history of the S.P.S. Athletic Association, its two highest athletic awards have been won by one man. This year J. D. B. "Jim" Bromley, succeeds Verne Booth and Hal Seymour as a double winner.

During his stay in S.P.S., Jim has participated in many and varied sports, and starred in all of them. For four years he played outside wing on School rugby teams, and was the best in the University in his position. He won a place on several all-star teams, and was awarded his wartime "V" at this game.

Although the above record would warrant his award, Jim's real athletic prowess seems to show best in the hockey rink. During the past year, he was one of the 'big trains' of the "Blues" hockey team, and he supplied plenty of thrills for the followers of the world's fastest sport here on the campus. Jim had a great season and it is too bad that he had only one year of Intercollegiate hockey. We're all hoping that he will be awarded his "T" in the near future.

Jim came all the way from St. John, N.B. to attend School, and nothing better ever came out of the Maritimes. It couldn't have happened to a better guy and to Jim all S.P.S. extends congratulations, and the sincere wish that his engineering future will be as bright and successful as his athletic life was, here at S.P.S.

ANXIOUSLY WAITING FOR THAT WINNING TOUCHDOWN

SCHOOL RUGBY TEAM—SENIOR MULOCK CUP CHAMPIONS

THE MULOCK CUP CHAMPIONS

THE SENIOR SCHOOL RUGBY TEAM THIS YEAR FIELDED ONE OF THE most enthusiastic and spirited teams in many a year. Though not a powerful team by any means, the boys really could go when the chips were down and certainly proved what team spirit, clean play and practice could do.

In the first game of the season, the Senior S. P. S. team outplayed their chief rivals U.C., last year's Mulock cup winners, to gain a 4 - 0 verdict. The only score came in the second half when George Evans kicked a placement.

The next game saw senior School beat Sr. Meds 6 - 0. It was a close fought game all the way with the only score coming when Bus. Booth scooped up a fumble and ran the length of the field to score.

In the next encounter with U. C., School only had the ball outside their own end twice during the game but scored majors both times to win 10-1. Our "pull out the middle plunger." Butko ran a U. C. fumble to the ten where Hendrick scored on our end run. "Rocky" Evans put the next touch across with a plunge after a power drive down the length of the field.

Into the finals now, Senior S.P.S. put out the St. Mikes squad by a 5 - 0 win. Keith Hendrick's kicking and Bert Hamm's placement accounted for the score. St. Mikes fielded a powerful passing team but the Schoolmen were able to hold them.

With at least twenty out to practice every night under the flood-lights School entered the final game with U.C. for the Mulock Cup. Without a doubt the Engineers played their most spectacular game of the season as they overwhelmed the artsmen 13 - 6. With the wind at their back school ran the score up to 5 - 0 with a placement and two singles in the first quarter. In the last minute of the second quarter U.C. scored on a beautiful pass from Millen to Hendrick and Hamm converted. It was School's game all the way.

Congratulations, gang. Let's keep that Mulock Cup at School.

Dana Collings
Bob Moore

Coaches and Managers

SOCCER I

Back Row: J. McDonald, R. Hibbard, W. Adams, J. Robinson, H. Denham, R. Murphy.
Front Row: B. Stoicheff, R. Ehrlich (Mgr.), N. Emms, K. Ahuja, E. Jung.
Absent: D. McNair.

SCHOOL I SOCCER

AFTER THE USUAL RITES CONNECTED WITH REGISTRATION HAD been taken care of, the soccer players at School looked around, made small mental calculations, and figured that with the players of previous years that were drifting about just aching to turn the nice green campus into dog-chewed carpet, School should be able to turn out a championship team.

The team sure looked like a powerful aggregation on paper, and on the field they lived up to it, except that they couldn't seem to dent their opponent's net. However with Emms in goal, about the strongest goalie in the league, and Ehrlich and Hibbard as fullbacks, not many goals were needed to win a game, as this threesome only allowed a total of three goals in nine games. On the half line were McDonald, Murphy and Ahuja, with Robinson, Adams, Denham, McNair, Jung and Stoicheff up front on the forward line. Of these, Robinson, at outside, seemed to turn in the best efforts, although the rest of them matched his strides most of the time.

At the end of the regular schedule, the team was tied with Meds for the second playoff spot, but this team was eliminated in a sudden death game, and School went on to destroy Forestry's hopes quite easily. However, in the semi-final round, Trinity took advantage of a lapse on the part of one of the fullbacks to bring a fairly successful soccer season to an end for the School Firsts.

Next year the 'paper' team won't look so good, as most of this year's team is graduating, however, with some of the players coming up, perhaps School will bring the Arts Faculty Cup back to the shelves of School.

R. P. Ehrlich, *Manager*

SOCCER II

Back Row: W. Macke, J. Kennedy, H. Kohl, S. Spivak, W. Redell, S. Love, R. Ehrlich (Mgr.).
Front Row: P. Zavitz, S. Sandler, Y. Shimizv, M. Stein, G. MacHattie.
Absent: R. Simms.

SCHOOL II SOCCER

THIS FALL THE SECOND SOCCER TEAM FOR SCHOOL WAS PLACED IN group three along with Wycliffe and Meds II. Not much trouble was encountered with either team, the record being three wins and one tie. The first playoff game, against Knox, resulted in a tie, but a replay gave School the right to go on. Zavitz booted in the winning counter. In the semi-final round the strong Victoria team was encountered, and they gave School their first and only defeat. This Victoria team went on to take the championship.

The team had a nucleus of seven men from last year's team, and these men, with an additional six hard fighting soccerites, gave the team all round strength. They improved with every game that they played, with Zavitz, Kohl, Sims, Redcell and Spivals deserving special mention. As two of the top players were absent from the game against Victoria, the 'fighting seconds' need not be ashamed of their showing. Next year the team should be rounded into a champion contender.

R. P. Ehrlich, *Manager.*

SCHOOL I HOCKEY TEAM

Back Row: R. Moore (Mgr.), G. Lawson, P. McDonough, J. Radcliffe, D. Davis, M. Sabiston, R. Morrish.
Front Row: H. Johnson, R. Fortin, S. Maden, D. Saunders, D. Simpson, K. Andison.

SCHOOL I — HOCKEY
JENNINGS CUP CHAMPIONS
1946

FOR THE SECOND YEAR IN A ROW SCHOOL I WON THE JENNINGS Cup.

The team started the season with a win over Meds. to a 4-1 count. Then Vic. and U.C. defeated School two games in a row and at this point the boys began to bear down. Several practices ironed out the kinks and the team won its three remaining games of the schedule.

In the first round of the play-offs Meds. III gave little opposition. In the second round, the highly touted Trinity "A" s were drubbed 9-1. In the finals, Senior School hooked up with Vic. in the best of three series, who proved to be the best opposition of the year. The first game went to School 15-4, but the score did not indicate the play. The second game was a real thriller, and was anybody's game 'till about midway through the final frame, when School really paid off and rang up a 6-1 score to take the silverware.

Stand-out performer for the year was Don Saunders, the best goal-keeper in the University. The forward lines were many and varied, with injuries and the lack of right hand shots presenting the main difficulties. Art Ridler was eliminated early in the season by a knee injury. Don Davis, (Rip) Radcliffe, Stew Martin, and Gord. Lawson combined to form a stone-wall defence, Martin and Lawson being converted forwards. (Basher) Morrish, (Sailor) Johnston and Mac. Sabiston made up one line. Morrish and Johnston did the hat-trick once during the play-offs, and Sabiston twice with eight goals in three games. Simpson, McDonough and Andison were the other line. McDonough, a real speed merchant, and Simpson, played well together and scored frequently. Andison was the best two-way man on the ice. Russ. Forten turned in valuable service during the schedule but missed the play-offs.

Special thanks to "Chunky" Moore for valuable assistance with the coaching duties.

JOHN SPRATT,
Manager.

SCHOOL II HOCKEY TEAM

Back Row: J. Bromley (Mgr.), E. Sutton, W. Tranmer, W. Stepkowsky, G. Muddiman, K. Young.
Front Row: M. Guppy, T. Phelan, R. McCombe, R. Mosher, G. Shaw.

S.P.S. II HOCKEY

"We Were Robbed."

School II had a very successful season only to be out lucked in the play-offs by Business Administration. This play-off took two games to complete as first game ended in a tie.

The team was made up of two battling lines. One of the lines consisted of the veterans, Tom Phelan; Ren Young and Ted Sutton. There was quite a similarity between this line and the "Punch" line for the Canadiens, even to a left winger being used on right wing. This line hit their peak against Meds II when each member had seven scoring points, the top effort being made by Tom Phelan as he scored 5 goals.

The other line of Bill Trammer, "Step" Stepkowski and "Moe" Mosler supplied most of the spirit and sparked the team in many games.

The defence was made up of Mark Guppy, who was the hardest hitting defenceman in the Interfaculty league, George Shaw, the smartest (laziest) defenceman, Mud "Reliable" Muddiman and Eric Major—the biggest man on the team.

The above players were ably backed by Bob McComb who played sensationally in the school net.

Jim Bromley,
Manager.

HOCKEY TEAM—S.P.S. III

Back Row: B. Seymour, S. Forstrom, J. Phelan, J. Spratt, K. Sharpe.
Front Row: J. Walker (Mgr.), A. Sentance, V. Stock, B. Schultz, S. Wadell.

S.P.S. HOCKEY III

"It is better to have played and lost, than never to have played at all."

Due to circumstances beyond our control, S.P.S. III did not reach the finals of this year. However, we did have one great consolation, that being the holding of "Trinity A" (the surprise team that played in the semi-finals with Sr. Skule) to a tie.

The team comprised of Goal—Harry Denham; Defence—"Sid" Forstrom; Val Stock; Bob Seymour; "Brick" Bradford; Lines—Johnny Spratt; Bob Smith; "Shifty" Schultz; Stu Wadell; "Jack" Phelan; Al Sentance. Summing up the activities of the club during the year, the boys showed a lot of team spirit and co-operation which is in itself the main constituent of a successful season.

Johnny Walker,
Manager.

SCHOOL SKI TEAM 1945-46
INTERFACULTY CHAMPIONS

Revival of interfaculty skiing this year saw a strong School team sweep to an impressive victory in a large turnout of competitors from every school and faculty. Individual winner of the meet was Alf. Hanson, a first year Skuleman, who in his first try at competitive jumping, outdistanced the hill record to win the event with a jump of 58 feet. Alf. also gained a second in cross country and a third in slalom to walk off with the four way championship. The other members of the team, all second year men, ably supported Hanson's fine showing with Canover winning the downhill, Armstrong taking a second in jumping and Ted Hill, Russ Stevenson, Murray Jacobs, Eric Manchee and John Rankin all contributing to the total points which brought the skiing plaque back to S.P.S. again.

The team showed some promising members who will help round out the Intercollegiate team next year and will be able to help the Engineers put out still better teams in the future.

IV HOCKEY TEAM

Front Row: R. Morrison, C. Miller, J. Robinson, B. Harper, G. O'Sullivan.
Back Row: R. Galpin, W. MacDonald, W. L. Walker, J. Freeburg, J. N. Booth, R. Butterworth, H. Denham (Mgr.).

SCHOOL V HOCKEY

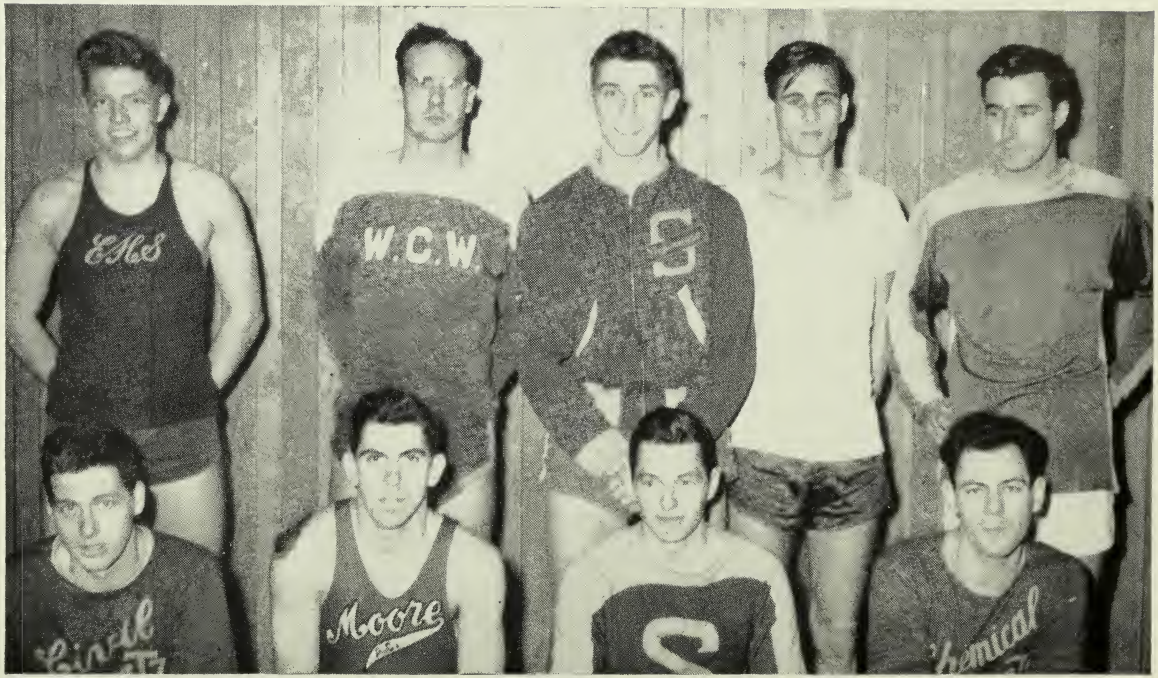
THIS YEAR, SCHOOL V'S DID THEMSELVES PROUD BECAUSE THEY were the only School hockey team to remain undefeated and untied throughout the entire schedule. In six league games these laddies dunked 42 goals into the opposition's twine while only 7 were scored against them.

Shugg in goal, with Sargent and Wilkes on first string defence, provided the team with a real strong defence that was hard to beat. Newhouse, Hall and Ewing, defence substitutes, played real sound hockey every time out.

Offensively, the line of Johnson, Bull and Service was the sparkplug of the team. These boys passed the opposition dizzy and they scored several goals.

Staples, McRae, Plunkett and Halpenny, the second line alternates, were very effective, especially when the going was tough.

JIM BRADFORD,
Manager.



SENIOR BASKETBALL

Back Row: K. Hendrick, S. Robertson, R. Tredgett, T. Wilson, R. Seymour.
Front Row: R. Hallawell, H. Hamm, L. Farquhar, L. Bratty.

SENIOR SCHOOL BASKETBALL SIFTON CUP WINNERS

In the first group, in the major league, the seniors were pitted against Jr. U.C. "A", Sr. Meds., P.H.E. I, and Vic. I. None of these teams were able to take a game from the Schoolmen in the regular season. After a pair of exhibition tilts against their counterparts from Ajax, which were won fairly easily, the boys started into the big race for the silverware emblematic of interfaculty championship.

Because of their undisputed position in the league standing, they were given a bye into the quarter finals against P.H.E. II, This quintet of phys. eds. proved to be too weak to prevent the seniors from running in some fifty odd points. In the semi-finals, pre Meds "A" also fell before the high scoring Schoolmen to the tune of 53-24. The high hopes of the Trinity "A" squad for the Sifton Cup were dampened considerably when the Schoolmen took the finals two straight by virtue of 39-32 and 46-33 scores.

The Players—Lou Bratty, Lorne Farquhar, 'Jasper Hallowell, Ben Hamm, Keith Hendrick, 'Stu' Robertson, Roy Tredgett and John Wilson.

Their record—Games played—12, Games won—12.

As you can see from the above, the fellows were pretty hot, and if any were to be given individual mention, they would all have to be, so it is sufficient to say that they brought the Sifton Cup to School and hope to do the same next year.

'Spike' Hennessy,
Manager.

JR. SCHOOL BASKETBALL

THIS YEAR'S JR. SCHOOL SQUAD WAS A HIGHLY REGARDED OUTFIT from the start of the season. They finished the regular schedule with but one black mark against them—a loss to Jr. Vic. by the close score of 24–23.

Being regarded as one of the strong teams in the league, Jr. S.P.S. got a bye into the quarter finals, where they met the relatively unknown S.P.S.V.

In this sudden death game the boys met a fast breaking team playing a game defense, and their own smooth run—in plays which had been clicking all season were thwarted by the tactics of their opponents.

After a hard fought game the score stood at 36 to 31 for the V's and the season ended for the Juniors after playing heads-up ball all season.

JOE MESCHINO AND AL JACOBS—co-captains and high scorers for the team—both added much to the spirit and fight of this year's squad.

JACK MCREYNOLDS—played Blues last year but was slowed down this season by a leg injury and hence did not exhibit his usual stellar performances on the court.

DON BLAIR—played good ball all season and hooped many an important basket. Don would be an asset to any team.

PAUL PHILLIPS—a scrappy forward and tricky ball handler.

CLYDE FITCH—"The hook-shot man"—pops them in with both hands and leaves opponents amazed and dumb founded.

DON MCCLAREN—proved his ability to score as well as check closely in the games during the season.

BOB UFFEN—6′3″—the lad that gets the rebounds. Because of an injury received in the S.P.S.V., the boys lost this very important cog in the team machine.

DOUG MARSHALL—6′1″—a star on the offense as well as on the defense—has a deadly one hand shot.

JOHN JAGIELNIK—"Chick"—played well at guard all season and set up the team's run-in plays.

L. R. FARQUHAR,
Manager.

S.P.S. IV's BASKETBALL

Jack Darwen—A former airman who hails from Brantford, "Stinky displayed the smooth form he has shown in several years of air force and high school play. Jack is a good all-round man on the floor and his height showed to great advantage on many occasions.

Doug. Price—A fourth year man who has played several years for department teams, Doug played with the fourths this year and fought hard all the way.

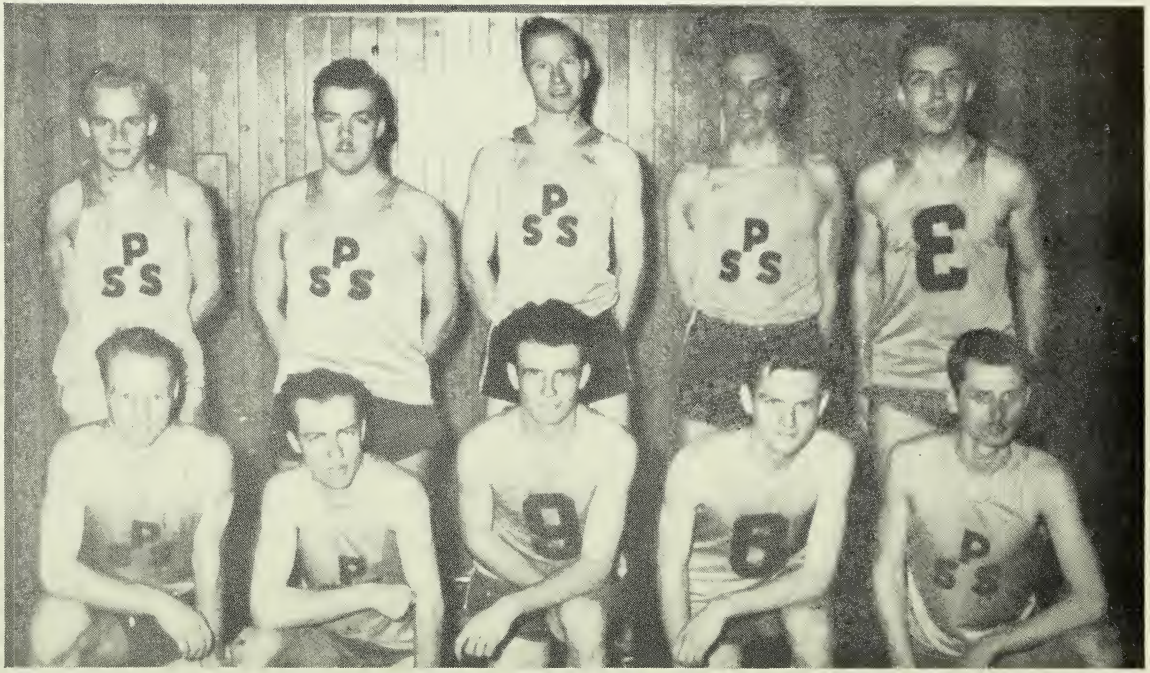
Alec Mark—Alec is a veteran of three years standing, having confined his activities to the fourths throughout his college career. Displaying a wicked one-handed push shot he should round into shape under the coaching which he may receive in other leagues.

The "Bate" Brothers—These boys, in their second year at S.P.S. showed an ability to grasp the fundamentals of the game and soon rounded into form. Both of them know what a basketball is and with a little supervision should develop into a pair of scrappy players.

The "Rootham" Brothers—Our second brother act carried much of the mail throughout the year and showed plenty of the old fight. Next year's manager would do well to watch these men.

John Mott—You can blame him for this mess.

John Mott,
Manager.



SCHOOL V BASKETBALL TEAM

Front Row: E. Earling, S. White, H. Jackson, R. Shonk, R. McGaw.
Back Row: J. McNeil, J. Drohan, R. Fletcher, G. Gibson, W. McBride (Mgr.).

SCHOOL V—BASKETBALL

THE SURPRISE TEAM OF THE YEAR WAS THE "AMAZING SCHOOL V's" to quote the *Varsity*.

Undefeated in their own group they were matched in the play-offs against Vic which they defeated, Then Jr. School fell before them. Although defeated in the semi-finals by Trinity, they put up a terrific fight right to the last whistle.

The big line was centered by Shonk, with Erling and Fletcher on the forward line. McNeil and McGaw were the guards and it took a good man to gather in a rebound before they did. The other line consisted of Paterson, Droham, Jackson, Gibson and White.

The success of the team can be attributed, I think, to that old bogey called "fight". This gang didn't know when they were licked, and they never were, in spirit.

BILL MCBRIDE.
Manager.

JUNIOR SWIMMING

Back Row: B. Gilbert, W. MacDonald, R. Prudhomme, R. Tress, E. Granfield.
Front Row: P. Turnbull, D. Fleet, W. Flanagan (Mgr.), N. Bowden.
Absent: H. Johnston.

JUNIOR SCHOOL SWIMMING TEAM

SCHOOL HAS FINALLY LOST THE INTERFACULTY CHAMPIONSHIP. After five consecutive years of supremacy in the Hart House pool, the Faculty of Applied Science yielded the crown to U.C.

It was a tough loss to take this year. The team was one of the strongest that School has sent out. Interfaculty records were smashed right and left, and, all in all, the team had an appearance of being a sure bet. The league games were just a formality to go through before the playoffs, and then the axe fell. U.C. had a team that was also revising the interfaculty records. This final meet was one of the fastest that has been run off for a long time. New times were set for the breast stroke at 29.3 seconds, for the back stroke at 30.9. In the fifty yards free style, the result was a dead heat with Opie of U.C. and Turnbull of School clocking in together at 24.8 seconds.

The times show the sort of team Junior School had, and although it was a tough season to lose, U.C. deserved to win as they had a fine championship team, and deserved a lot of credit.

The lineup that hit the water for School was as follows:

PETER TURNBULL—The big gun of the team. He remained undefeated all year and will be a big threat to other colleges when the Blues hit the road again.

TED CRANFIELD—A powerful freestyler who swam neck and neck with Pete all year. He will be an asset to the Blues.

BILL MACDONALD—Another Varsity swimmer. He hit some low times in the backstroke.

BOB PRUDHOMME—Bob is a very powerful and smooth backstroker. His greatest rival was his own team mate.

BRUCE GILBERT—Bruce remained undefeated in the breast stroke until the finals when U.C. threw Al Marshall, present Canadian Champ, at him. Bruce still gave Al a fight for his money.

NORRIS BOWDEN—A fine breast stroke swimmer. Placed first in many races and was always reliable.

DON FLEET—A fast man on the relay, he turned in many fine races.

BOB TRESS—Rounding out the team, Bob was a real help on the relays, and showed lots of speed.

BILL FLANAGAN, *Manager.*

SENIOR SWIM TEAM

Standing: J. Palframen, R. Grey, J. Martin (Mgr.), J. Rook.
Sitting: H. Ballou, W. Flannigan, R. Booth, G. Boa.

SENIOR SCHOOL SWIMMING TEAM

THE FALL OF '45 SAW SENIOR SCHOOL "POOL" A TEAM OF NEW faces, all but two of last year's seniors having graduated.

The team gained two men from the thirds of last year, Bus Booth and Jack Palframan, both good free stylers, with Jack swimming and winning in the back stroke heats as well. Hank Ballou and Bob Grey joined the team moving up from School water polo teams. Hank made our second back stroker and Bob our top breast stroker

Completing the team were Bill Flannigan (of diving fame and last year Sr. School Championship team) and John Rook, who should have been swimming for School years ago.

Oh yes, Gil Boa and Jim Martin, a couple of hang overs from last year, were both erstwhile freestylers.

During the season we swam six meets in the top league against U.C.I., Vic and Meds I, defeating Meds and Vics once each. Our worst defeats were suffered at the hands of the Championship U.C. squad. We tried hard fellas.

Jim Martin, *Manager.*

SENIOR SCHOOL LACROSSE TEAM

Back Row: W. Moorehead, M. Davey, T. Hennessy, R. Tredgett, P. Cross (Mgr.), R. T. Sheppard.
Front Row: L. Venchiarutti, S. Cooke, L. Farquhar, E. Teghtsoonian, C. W. Daniel.

SENIOR SCHOOL LACROSSE TEAM

THE SENIOR SCHOOL LACROSSE TEAM HAD THE DISTINCTION OF NOT winning a game this year, although on several occasions, came very close, and by the end of the season the players were beginning to hit their stride.

The players from last year's senior team, namely Sheppard, Cooke and Venchiarutti were always dependable and gave their best. From the junior ranks of last year came Farqukar, Glenn, Teghtsoonian, flashy Tredgett and the ever dependable Spike Hennessy, the best goalie in the league. After the football was finished, we obtained the services of Creamer Daniels who has improved greatly from last year.

Several boys, who have been away from lacrosse for several years due to military service, returned and added much scoring punch to the team. Davey, Moorehead, and McDonough should add much to next year's team.

Nice try, fellows, and better luck next year.

P. S. CROSS,
Manager.

IV LACROSSE TEAM

Back Row: H. Denham, P. Fellows, P. Gardiner, J. Ellwood.
Front Row: D. Squires, A. Cooke (Mgr.), H. Shugg, J. Newhouse.
Absent: R. Howard, R. McCombe.

SCHOOL IV LACROSSE

AFTER A TOUGH STRUGGLE WITH ST. MIKES, SCHOOL IV LACROSSE managed to end up on top of their group. The team lined up along these lines;

Goal—Howie Shugg—Howie was new to the game, but played well in goal.

Defence—Doug (hit him again) Squires just returned from the Air Force. He played a hard game, hard enough to break his wrist and put him out for the rest of the season.

Center—Ralph Howard—played a great game in spite of his size thirteen shoes. Ralph came to us from the Navy.

Rover—Jack Newhouse—fought all the way and managed to score a goal a game—even one for St. Mikes.

Home—Jim Ellwood—slow but sure. He was the top scorer of the team. He's another Navy boy.

Filling in when the rest of the players got tired, which was fairly often, we had Pete Fellowes, Harry Denham, Pete Gardiner and Bob McCombe.

AL COOKE,
Manager.

S.P.S. III—LACROSSE TEAM

THIS YEAR'S THIRD LACROSSE TEAM, COMPOSED MAINLY OF AN EAGER group of novices, were no championship team. However, what they lacked in experience and polish they made up for in drive and fight. They played to win, because they loved the game. The other teams composing the group had a little more of that "savoir faire" and turned out to be a tough proving ground for the IIIrds, but the boys will be that much older in experience next year and will certainly benefit from the games they played against better teams.

Different line combinations were tried continually to give the players a chance to work out their own individual abilities so that in future years they can be moulded into a real unit.

The whole team played well, but outstanding were Al Sentance, who played a brilliant game at centre, and Bob Love who alternated at defence and forward. Morrison scored many timely goals in a strictly rugged manner. Our goalie, little Lon Mark, stopped the proverbial million playing a steady game in the nets.

The team didn't win any games, though they came close, and didn't give up without a fight in any encounters. To all the players my thanks for the lively spirit displayed during the season.

R. T. SHEPPARD,
Manager.

SCHOOL IV SWIMMING TEAM

In their first contest, against St. Mike's "B" team, School had their toughest battle, and went down to a close defeat. After this encounter, they went on to win the next five straight meets, in each game winning by a 50% margin. The team then entered into the preliminary playoffs, but here they suffered a 19 to 14 defeat at the hands of a more experienced Dents team, from a higher grouping. The team, most of them making their debut in the contests in the big tank, consisted of the following men:

Sachs—a fast crawl swimmer and a handy man for the breaststroke.

Hall—usually he was to be counted on for some points in the breaststroke.

Wilson—excellent backstroke, and a sure fire hit in a relay.

Robinson—one of the new members, but was full of fight.

Wiegand—another new man with lots of team spirit.

Kohl—has developed a fast dog paddle in the years he has spent in the pool.

Weir—managed the team and proud to work with them.

John W. Weir,
Manager.

III VOLLEYBALL

Back Row: V. Harrison, W. McBride, R. Howard, J. Hallawell.
Front Row: T. Jarvis, T. Ivory, G. Thatcher, L. Butko.
Sitting: P. Boivin (Mgr.).

SCHOOL III VOLLEYBALL TEAM

THIS YEAR THE S.P.S. III VOLLEYBALL TEAM WAS ONE OF THE BEST. There was however, one drawback, namely, that it didn't win the championship.

The opposition in league play wasn't heavy; we stood at the top of our section with six wins and no losses. This was accomplished with such stalwarts as Vic Harrison, Tom Jarvis, and Ralph Howard who were spikers. Set-up men such as Jasper Hallawell, Lou "Hard to find" Butko, Gordy Thatcher, Bill McBride, and Tom Ivory helped considerably.

In the playoffs we took Junior School and P. & H. E. I.'s without much trouble. This put us into the quarter finals. Then everything collapsed when Junior U.C. won two games straight which put them into the semi-finals.

We enjoyed a good season but the greatest difficulty was that our versatility was limited to one system of play only. It is my hope, however, that next year will see "Skule" winning the championship.

PHIL BOIVIN,
Manager.

SCHOOL IV VOLLEYBALL TEAM

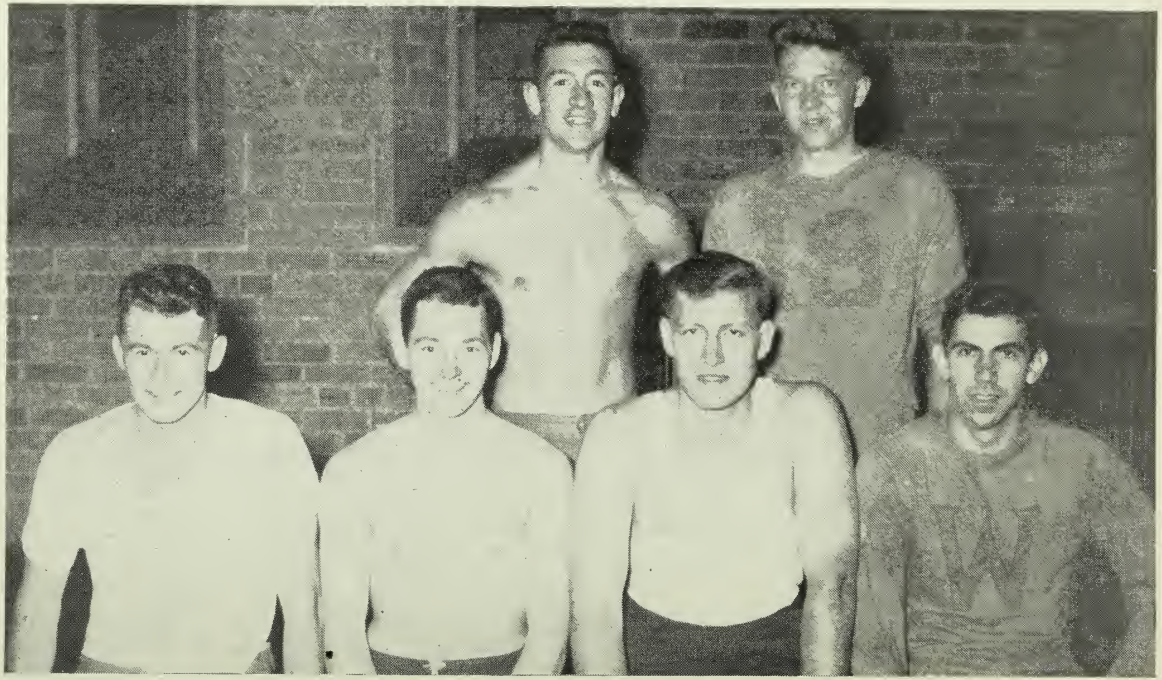
ALTHOUGH THEY DIDN'T WIN THE INTERFACULTY VOLLEYBALL championship, here pictured are seven fellows who, despite handicaps of inexperience and lack of practice, made a determined effort in every game.

Tredgett was an excellent spiker, and collected many points with his hard overhand smashes. Norm Greenspoon also spiked well, as did Phil Elias, the latter being the main steadying influence on the team. Harry Ballantyne, Jim Trott and Jack Stubbs could always be counted on to turn out and put on a good show, and coach Jack Swan was pleased to manage such a reliable and steady, if not starry, aggregation.

J. SWAN,
Manager.

IV VOLLEYBALL

Front Row: J. Stubbs.
Middle Row: H. Ballantyne, A. Trott, N. Greenspoon, P. Elias.
Back Row: R Tredgett, J. Swan (Mgr.).



SENIOR SCHOOL VOLLEYBALL TEAM

Back Row: T. Hennessy, K. Hendrick.
Front Row: M. O'Loughlin, L. Farquhar, A. Campbell, H. Hamm.

SENIOR VOLLEYBALL

SCHOOL'S SENIOR VOLLEYBALL TEAM HAD A RATHER UNSUCCESSFUL season this year, winning only three of their six games, and failing to win a playoff berth. Perhaps next year the team will be better organized, and will get away to a faster start.

GILMOUR S. BOA,
Manager.

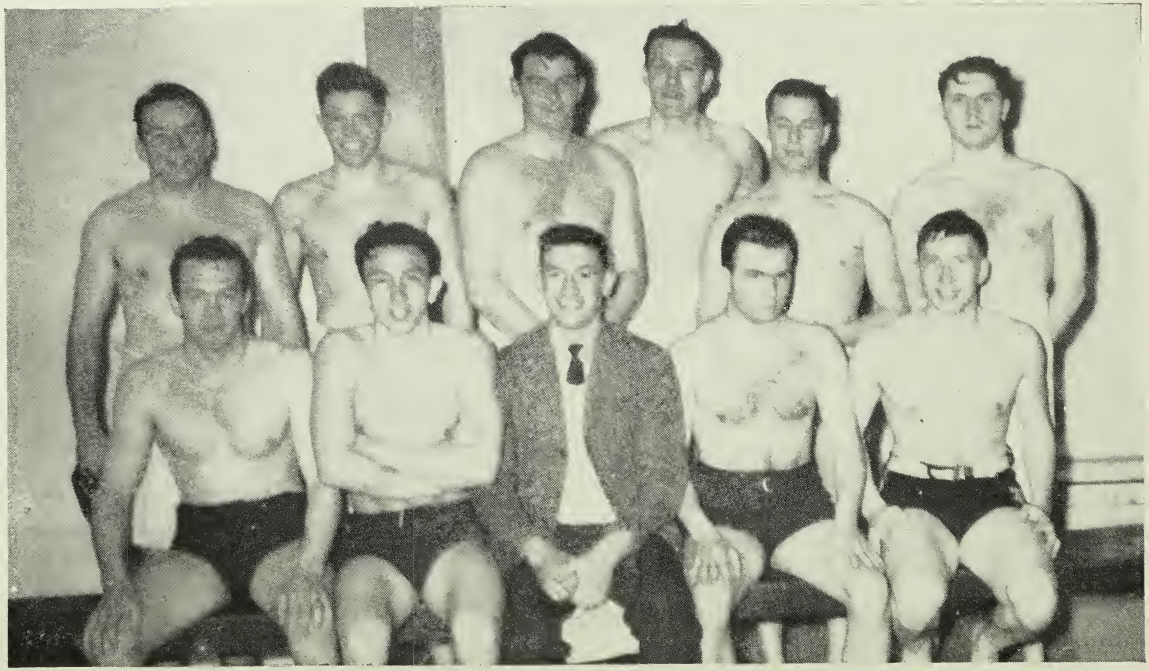
GIRLS CLUB

ANOTHER SKULE YEAR IS NEARLY OVER DURING WHICH THE GIRLS at S.P.S. have enthusiastically if not skillfully entered the different fields of sport.

The sport year began with the Inter-Faculty tennis tournaments. Cynthia Allum Poon, III Yr. Chemical, and Persis Hughes, II Arch., were Skule's contributions. Although Cynthia went down to defeat she upheld the honour of Skule by giving her opponent stiff competition. Unfortunately Persis was disabled by a foot ailment before the game and lost by default. Better luck next year, girls. Basketball was next on the sports schedule and as last year we joined with the girls in Meds to form the Meds—S.P.S. team. Shelagh Rounthwaite, IV Arch., and Persis were the S.P.S. section of the team. The team had fun playing many exciting games but they did not quite make the semi-finals. There is always another year so the girls will be in there pitching again. At the moment the hockey games are in progress. Joyce Craig, II Eng. Physics, is the girl from School on the Meds—S.P.S. hockey team. They have won all their games in the regular series. And now they enter the play-offs undefeated! Good shooting, Joyce.

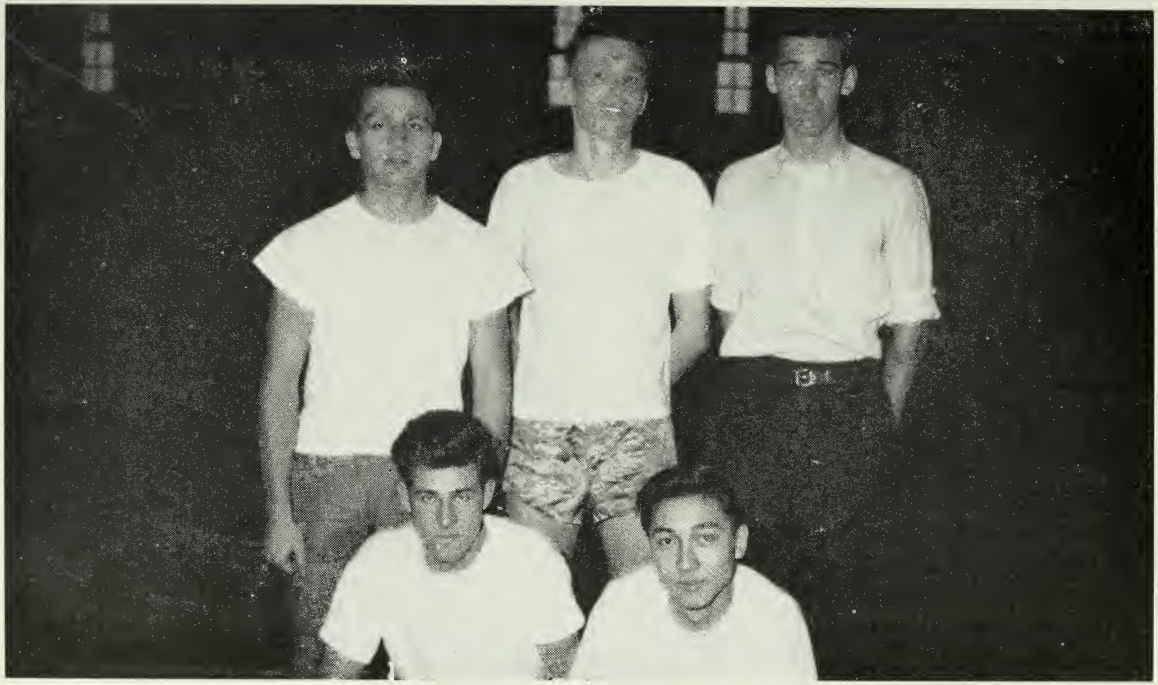
And so Skulegirls say goodbye to sports for another year but, for better or for worse, we'll be back again.

PERSIS HUGHES,
Athletic Representative.



SENIOR SCHOOL WATER POLO TEAM

Back Row: G. Boa, K. Hendrick, A. Campbell, D. Mulholland, J. Martin.
Front Row: W. Arthurs, J. Gray, T. Hennessy, H. Kohl, H. Ballou.



JUNIOR VOLLEYBALL

Back Row: W. Stepkovosky, J. Jagienlnik, J. Swan.
Front Row: P. Phillips, Y. Shimizo.
Absent: N. Campbell, N. Greenspoon, K. Hendricks (Mgr.).

INTER-FACULTY TRACK MEET

ONCE MORE IN 1945-46, SCHOOL WALKED OFF WITH THE HONOURS in the Senior Track and Field Meet. Their nearest competitor was Meds, with thirty points, but School had a handy lead of twelve points.

Art Jackes was the only record breaker of the day, setting a new high for the high jump, clearing the bar at 5 ft. 10¾ inches. Art has done a lot of jumping, in the Air Force before he came to School and, last year at C.O.T.C. camp in Petawawa, he set a new Canadian Army record in the field day held there.

S.P.S. placed a winner in every event of the fourteen except four of them, the 220 High Hurdles, 220 yard dash, Running Broad Jump, and the one mile run.

Pole Vault—R. Dales, a schoolman, hoisted himself up to 9 ft. 11 inches to cop a first for School in this event.

High Jump—This is the one that Art Jackes went way over his head in, followed by two more schoolmen, J. A. Grierson, and W. Kerr, both of whom really lifted themselves off the ground.

With the Discus and Shot Put, J. Orr pulled down a couple of seconds and J. Marshall showed in the discus.

A few more schoolmen conld get out there and stretch their legs on the track, as this is the department where School is weakesr. F. Fordyce grabbed a second in the half mile, and thirds in the 220 low hurdles and the 440 run. C. MacDonald placed in the 100 yard dash, and W. Adams garnered another point for S.P.S. in the three mile run.

Sports Editor.

JUNIOR SCHOOL WATERPOLO

PUFF! THAT WAS THE SOUND MOST OFTEN HEARD WHEN THE Juniors were playing. Not that the team was short on condition, but the other teams always seemed to have a bit more. In spite of this, they had an extremely successful season, beating Vic I, 3-1 and 2-0, Dents to the tune of 5-3 and 7-2, and then winding up by romping over Senior Meds "B" 7-0 and 10-2. This was certainly not bad for a team that was new at the game.

Ron Brown, Bob Tress and Don Fleet were the three hold overs from last season, and Ron was usually the high scorer of the game, he should be holding down a spot on the Blues next year. Tress' greatest difficulty was lack of condition, but he improved greatly as the season went on.

Frank Godfrey, playing goal for his first waterpolo season, was nothing short of marvellous. He was one of the best in the league, being especially good on close in shots. Ted Granfield, who was on the Varsity swimming team, swam at centre and always gave us the advantage on the face offs. He will still be around next year, and be an addition to any of the School teams. On defence and forward, Bob Muddiman showed great promise, along with Bill MacDonald, the wonder boy of the team, who scored a goal in his first minute of play.

Don Campbell and Pete Fellowes turned in a good checking effort on the defense, and Bill Battrick and Craig Crignon gave everything they had to make the team a winning one. Pete Turnbull was a little slow catching on to the game at the start, but that was the only way that he was slow. A very fast swimmer, he should do well next year.

In the playoffs, Junior School walked through Trinity 12-2, but in the semi finals U.C. came out the victors. The Juniors managed to have the score tied at 2-2 at the end of the regulation time, but in the over time, U.C.'s greater skill overcame a tired School team's will to win, and they emerged on the long end of a 4-2 score.

However the record speaks for itself—43 goals for, and 11 against. Certainly nothing to harm School's record.

DON FLEET, *Manager.*

UNIVERSITY OF TORONTO CONTINGENT C. O. T. C.

Academic Year 1944-1945

THE OFFICER COMMANDING THE CONTINGENT DURING THE 1944-45 Training Season was Lt.-Col. W. S. Wilson, E.D., Asst.-Dean and Secretary of the Faculty of Applied Science and Engineering.

The major role of the C.O.T.C., as far as the Engineering students were concerned, was to select and train the Potential Engineering Officers for the Active Army in the particular branch of Engineering for which they were best qualified.

Special to Arm training in Military Engineering was carried out under Major H. W. Tate, M.B.E., Captain C. P. Thompson and Captain W. H. Steele.

Future F.C.E.M.E. personnel trained under Major W. E. P. Duncan.

The Signals group worked in the Signal Wing under Major G. T. Hodgson and Capt. B. C. Diltz.

Those interested in Armoured Corps formations trained under Captain E. L. Gibson in the Armoured Corps.

A number also trained in Field Artillery under Major G. Fay Davies.

In addition to the above training, Basic training was given to all physically fit students of the Faculty of Applied Science and Engineering under Major G. R. Lane.

Brief summaries of the Camp activities of the Engineers in 1945 are given below.

SUMMER CAMP 1945

E.M.E. Wing

1. "D" Coy. proceeded by train on 29th April to E.M.E. Training Centre at Barrifield.
2. Detachment was attached to an active service training company and during 1st week took an intensive course in shops and lecture room including Guns, Small Arms, A.F.V., Radar, Fire Control Instruments and Organization.
3. During the 2nd week detachment took part in field manoeuvres under active service conditions and gained experi-

ence in convoy work, L.A.D. work and recovery and attack by aircraft; flame throwers' smoke bombs and live ammunition.

4. "D" Coy. returned to Headquarters by train 12th May, 1945

Military Engineering Wing

The Engineer Company of the University of Toronto C.O.T.C., comprising some 100 other ranks, left for the Engineer Training Centre at Petawawa on Saturday afternoon, the 28th April, 1945.

The Company was under the command of Major H. W. Tate, with Lieuts. K. Chisholm and O'Brien as platoon commanders, and A. I. Campbell as Company Sgt. Major.

The Engineer Training Centre was under the command of Lt.-Col. R. J. Cassidy, O.B.E., who had been C.R.C.E., 3rd Can. Div. Engineers in the Normandy landing.

Col. Cassidy and all his officers and staff gave the cadets a most generous welcome, and during the all too short two weeks at the Centre, everything possible was done to give the cadets useful and interesting training.

Full instruction in the use of infantry weapons with range practise, demolitions, bridging, rafting, water supply, wiring, were among the subjects covered, and the universal regret of the cadets was that this was their first visit to the Centre and that the time was so short.

On V. E. Day, the Toronto cadets decisively beat the McGill cadets at softball, much to the sorrow of Major Morris, the O.C. of McGill contingent.

The Company returned to Toronto on May 12th and after sandwiches and coffee at the Armouries, was dismissed.

Armoured Corps Wing

The Armoured Corps Wing under Captain E. L. Gibson arrived at A33 C.A.C.T.E., Camp Borden, Sunday, 29th April, 1945. They received a warm welcome from Major Drake-Brockman, G. Staff, Armoured Corps.

Lt.-Col. Schell, C.O. of the T. & S. Wing placed one group under Lt.-Col. Finlay and Captain Sullivan for Tank Gunnery and the other group under Major Biggs in Armoured Corps Signal training.

These courses were very intensive and in the Tank Gunnery Courses at Meaford the boys were really laying them on the targets.

The Signals Wing trained in Armoured Corps inter-communication and in the final stages carried out intercom schemes in the tanks.

Artillery Wing

The Artillery Wing went to Petawawa and trained in Field Artillery Gunnery—Artillery Instruments and Tactics.

Basic Training Niagara Camp 1945

A contingent, composed of 211 First Year Engineering and Forestry students and including some former members of the University Air Training Squadron, left Toronto by special train for Niagara-on-the-Lake Camp, Saturday morning 28th April 1945, for two weeks training.

This contingent was under the command of Major G. R. Lane with Capt. Arthur Clarke, M.C. as 2 i/c. Niagara Barracks was taken over and it was fortunate because the weather was cool and changeable. Training was somewhat interrupted by V-E day but the most important features of the syllabus were covered including small arms firing on the ranges. This force was self sustaining and operated the barracks as a unit.

ALPHABETICAL INDEX OF ADVERTISERS

Yuba River Flood Control Channels Built During Gold Dredging Operation

Placer dredging at times can be undertaken in areas where levees or channels for flood control might be of definite value to the community. Such was the case on the Yuba River about twelve miles above Marysville, California. Two 18 cu. ft. Yubas were equipped with double stackers discharging at right angles to the dredges. These dredges built up tailings piles in parallel rows about 400 ft. apart and two deep channels, about five miles long, were constructed as the gold dredging progressed. After the channels were finished the voids in the new rock levees soon filled with silt and sand. Results were beneficial to all down-stream communities, especially Marysville, since flood waters are under better control. Actually the Yuba River still rises in these channels after it starts subsiding at points downstream.

This particular work was done twenty or more years ago in cooperation with U.S. Engineers. Later the special stackers were removed and single stackers for standard dredging have been used on the dredges since. If your plans include dredging for gold, platinum, or tin, perhaps there is some special feature or problem to be considered. Every dredge to operate successfully must be designed to meet the conditions of its ground. Let Yuba help by drawing upon its specialized experience of many years.

Everyone benefits from GOOD STREET LIGHTING

WELL-LIGHTED streets and highways are a community investment that pays all-round dividends—in public safety, traffic facility, social well-being and civic attractiveness. They minimize night-driving hazards — thus reducing traffic fatalities. They deter crime. They speed the flow of vehicular and pedestrian traffic. They stimulate business.

GENERAL ELECTRIC STREET LIGHTING

Bright streets mean a happier community—a more active community—a more prosperous community. They attract crowds to centres of shopping and amusement. They set a new stage for living and leisure . . . they set a new pace for civic growth. Bright streets today need cost no more than dim streets and modern street lighting equipment is available which provides generous light. Prominent in the development of this equipment have been the lighting engineers of Canadian General Electric whose services are at the disposal of all authorities interested in street and highway illumination.

CGE-1645X

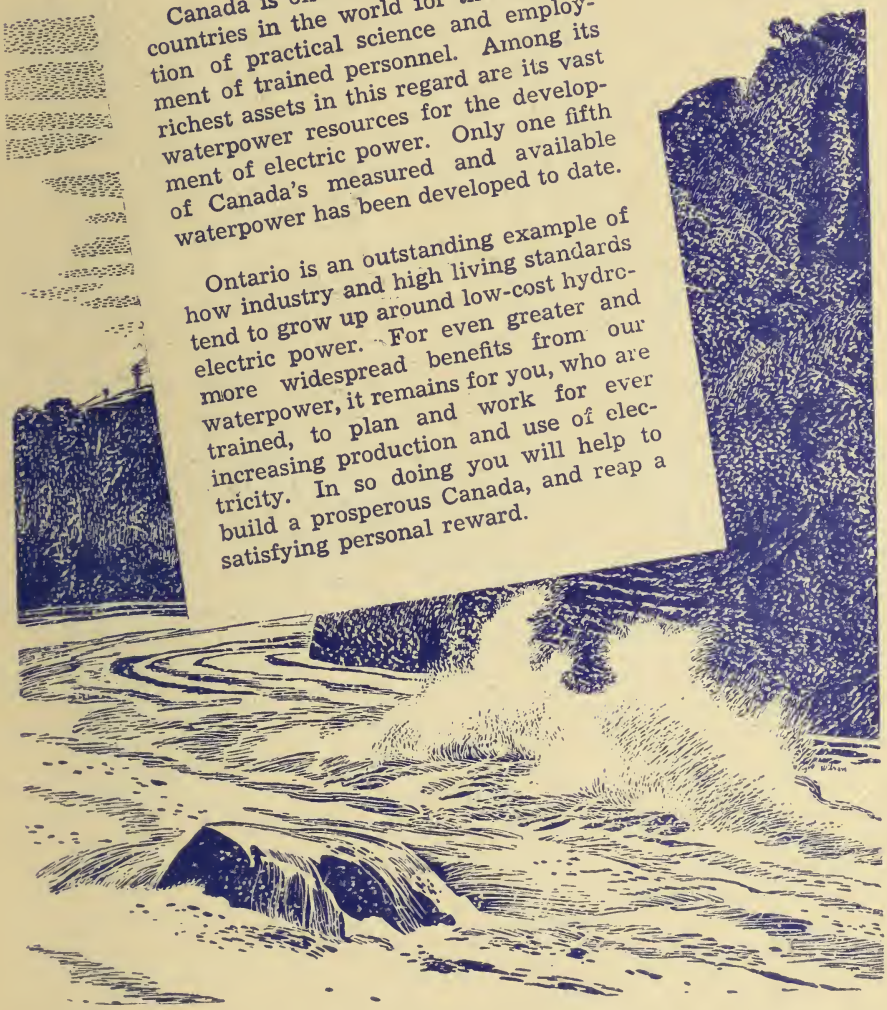
CANADIAN GENERAL ELECTRIC CO. LIMITED

HEAD OFFICE — TORONTO

WATERPOWER
Will Work For You!

Canada is one of the most promising countries in the world for the application of practical science and employment of trained personnel. Among its richest assets in this regard are its vast waterpower resources for the development of electric power. Only one fifth of Canada's measured and available waterpower has been developed to date.

Ontario is an outstanding example of how industry and high living standards tend to grow up around low-cost hydro-electric power. For even greater and more widespread benefits from our waterpower, it remains for you, who are trained, to plan and work for ever increasing production and use of electricity. In so doing you will help to build a prosperous Canada, and reap a satisfying personal reward.



THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

A FAVOURITE SHOP OF COLLEGE MEN

It's the Men's Shop in EATON'S-College Street.
An apparel centre sponsoring good taste,
styling that endures . . . the clothes
and accessories fashioned with young ideas.

MEN'S SHOP
EATON'S-COLLEGE STREET

The Men's Shop has earned its "letter" of approval
with college men . . . evident in the fact
that so many continue to come to the "shop"
after entering their chosen profession.

EATON'S-COLLEGE STREET